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7/1/98

**REICHHOLD, INC.**  
**Tacoma Facility**

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**QUARTERLY GROUNDWATER MONITORING  
RESULTS - July 1998**

**Corrective Action Groundwater Monitoring Program  
Twenty-First Quarter  
RCRA Permit No. WAD 009 252 891 (Part V.C.)**

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**FILE COPY**

**Prepared by  
CH2M HILL, Inc.  
Bellevue, Washington**

**November 1998**

**Reichhold Chemicals, Inc.**

3320 Lincoln Avenue  
Tacoma, Washington 98421

**REICHHOLD**

TO: Chief, Waste Management Branch  
U.S. Environmental Protection Agency, Region 10

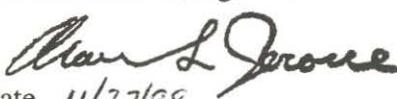
FROM: Alan S. Jeroue  
Reichhold, Inc.

DATE: November 27, 1998

RE: Reichhold, Inc., Tacoma, WA  
Quarterly Groundwater Monitoring Results – July 1998

Enclosed is the Reichhold Tacoma Facility, Quarterly Groundwater Monitoring Results – July 1998. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Alan S. Jeroue  
Tacoma Site Manager

  
Date 11/27/98

Attachment

cc: Supervisor, Hazardous Waste Section  
Washington State Department of Ecology  
Environmental Commission  
Puyallup Indian Tribe  
Port of Tacoma  
Ms. Robbie Hedeen  
U.S. Environmental Protection Agency, Region 10



## **July 1998 Quarterly Groundwater Monitoring Results**

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**PREPARED FOR:** U.S. Environmental Protection Agency Region 10  
Washington State Department of Ecology

**PREPARED BY:** CH2M HILL

**FROM:** Reichhold, Inc.

**DATE:** November 27, 1998

**REGARDING:** Reichhold Tacoma Facility, 21<sup>st</sup> Quarter (July 1998)  
Corrective Action Groundwater Monitoring Results

This document presents Corrective Action Monitoring Program (CAMP) data collected, analyzed, and submitted in accordance with Section V.C. (1) of Reichhold RCRA Permit No. WAD 009-252-891 (hereinafter referred to as "the permit") and modifications approved by EPA in January 1991, October 1993, and March 1995. These analytical results represent groundwater sampling conducted during the twenty-first quarter of the CAMP (July 1998).

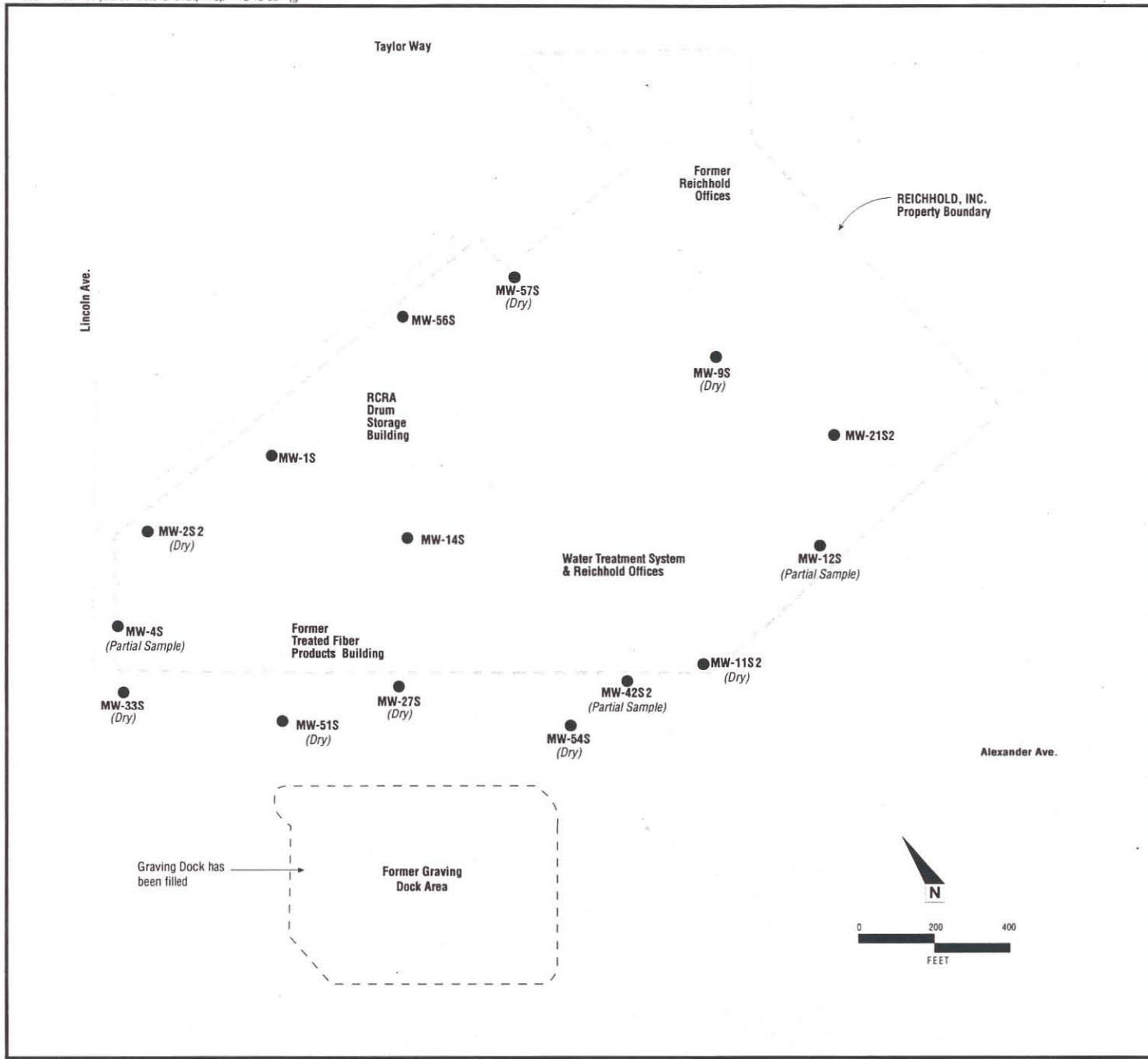
### **Groundwater Levels**

Groundwater levels were measured on July 21, 1998 for all groundwater monitoring wells, shallow interceptor drain (SID) piezometers, and extraction wells at the site. Water level data are presented in Attachment 1. Groundwater elevation contour maps will be presented for each aquifer in the 1998 Annual Groundwater System Performance Report to be submitted in early 1999 per conditions of Reichhold's RCRA permit. Groundwater levels, contour patterns, and flow directions are similar with data collected over the past several years indicating a consistent long-term hydraulic gradient.

### **Groundwater Quality**

Thirty five CAMP monitoring stations (15 shallow aquifer wells, 19 intermediate aquifer wells, and one sample from the water treatment system influent) were scheduled for quarterly sampling in accordance with the permit (see Figures 1 and 2 for monitoring well locations). Groundwater samples were obtained from 27 of the 35 monitoring stations. Eight shallow aquifer wells (MW-2S2, MW-9S, MW-11S2, MW-27S, MW-33S, MW-51S, MW-54S, and MW-57S) were dry during this sampling event because of seasonal low groundwater levels. Of the 27 monitoring stations with sufficient water for samples, three wells (MW-4S, MW-12S, and MW-42S2) had only enough water to yield partial samples.

Groundwater samples obtained from the CAMP monitoring stations were analyzed for constituents listed in Table 7 of Reichhold's RCRA permit. Analytical results for the July 1998 groundwater samples are included in Attachment 2. The water treatment system influent sample was analyzed for modified Appendix IX constituents (Table 6 of Reichhold's RCRA permit) and analytical results are presented in Attachment 3. A quality control check of the analytical data is provided in Attachment 4.



**KEY**

- MW-17I
- [L-shaped line] Well screen depth
- [line] Well number
- [line] Well location
- [dashed line] Property boundary
- [wavy line] Ditches

**Figure 1**  
**CORRECTIVE ACTION**  
**MONITORING PROGRAM**  
**SHALLOW AQUIFER WELL**  
**LOCATION MAP – JULY 1998**  
*Reichhold, Inc., Tacoma, WA*

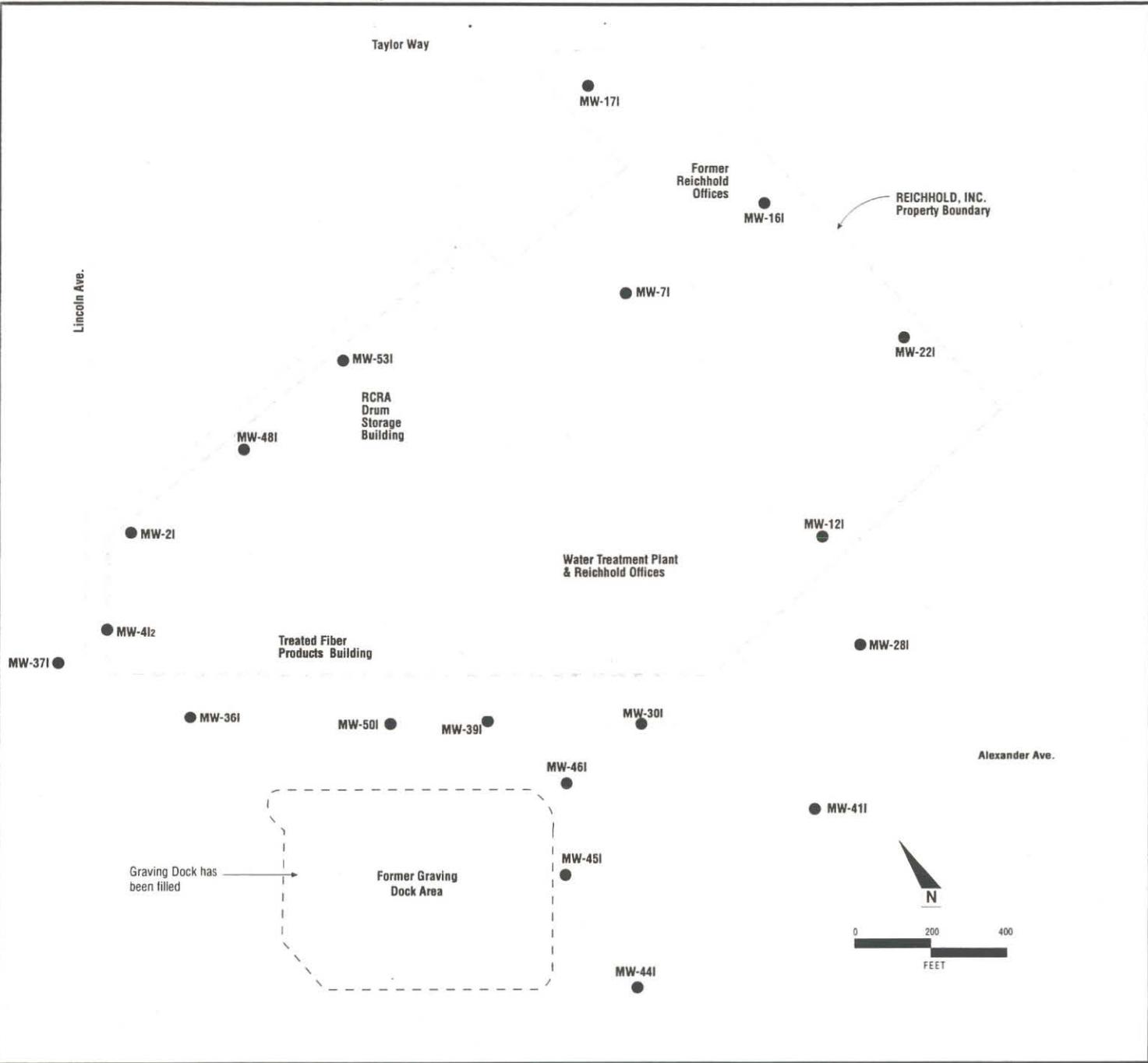


Figure 2  
**CORRECTIVE ACTION  
MONITORING PROGRAM  
INTERMEDIATE AQUIFER WELL  
LOCATION MAP - JULY 1998**

*Reichhold, Inc., Tacoma, WA*

Table 1 lists statistics on the number of CAMP monitoring wells in the shallow and intermediate aquifers that met the GWPS for Table 7 constituents during the July 1998 sampling event. Observations regarding groundwater quality at the site and the water treatment system influent quality are summarized below.

## Shallow Aquifer

### *Organic Compounds*

- Four of the seven shallow aquifer monitoring wells sampled this quarter met the GWPS for all organic constituents.
- The GWPS for 26 of the 31 organic constituents listed in Table 7 were met in all sampled shallow aquifer wells in July 1998. The five organic constituents detected above GWPS in the shallow aquifer were formaldehyde, 2,4,6-trichlorophenol, 2,4-dichlorophenol, pentachlorophenol and trichloroethene (see Attachment 2).
- Formaldehyde is the most common organic constituent exceeding GWPS in the shallow aquifer. The formaldehyde GWPS is the practical quantitation limit. This protection standard is several orders of magnitude below potential risk-based levels. Trichloroethene was also detected above GWPS in two shallow wells. Trichloroethene is not associated with past manufacturing processes and is not a break down product of chemicals used for manufacturing at the Reichhold site. For these reasons, chlorinated phenols are the key indicator constituents for the shallow aquifer.
- MW-14S contained four of the five organic constituents that exceeded their GWPS. This outcome was anticipated, because MW-14S is located adjacent to the former pentachlorophenol plant. The only other GWPS exceedences of organic compounds in the sampled shallow aquifer CAMP wells, was formaldehyde in well MW-21S2 and trichloroethene in MW-42S2.

### *Inorganic Compounds*

- The GWPS for 12 of the 18 inorganic compounds listed in Table 7 were met in the four shallow groundwater samples analyzed for inorganics (some shallow wells yielded only partial samples). Inorganic compounds detected above their GWPS were antimony, copper, manganese, molybdenum, nickel, and zinc. These metals are associated with ASARCO smelter slag, which has been used as fill in the vicinity, elevating the background concentrations of these metals in the soil, surface and groundwater in the vicinity. With the exception of molybdenum, these metals are not associated with past manufacturing processes at the site.

## Intermediate Aquifer

### *Organic Compounds*

Twelve of the 19 intermediate aquifer monitoring wells sampled this quarter met the GWPS for all organic constituents.

- The GWPS for 25 of the 31 organic constituents in Table 7 were met in all sampled intermediate aquifer wells in July 1998. The six organic constituents detected above GWPS in the intermediate aquifer are benzene, bis(2-ethylhexyl)phthalate, formaldehyde, pentachlorophenol, trichloroethene, and vinyl chloride (see Attachment 2).
- Formaldehyde is the constituent that most commonly exceeds its GWPS in the intermediate aquifer, exceeding GWPS in six wells. The other volatile organic compounds that were detected above the GWPS are not associated with past manufacturing processes and are not break down products of chemicals used for manufacturing. As in the shallow aquifer, chlorinated phenols are the key indicator constituents.
- The highest intermediate aquifer exceedence of the GWPS for pentachlorophenol was in intermediate aquifer well MW-30I. This outcome was anticipated because MW-30I is located near the construction debris area. Pentachlorophenol concentrations in MW-30I are generally declining, indicating improving conditions in the intermediate aquifer (Figure 3).

### *Inorganic Compounds*

- The GWPS for 9 of the 18 inorganic compounds listed in Table 7 were met in the 19 CAMP intermediate wells sampled. Inorganic compounds detected above their GWPS were antimony, arsenic, copper, cadmium chromium, cyanide, manganese, molybdenum, and zinc. These metals are associated with ASARCO smelter slag, which has been used as fill in the vicinity elevating the background concentrations of these metals in the soil, surface and groundwater in the vicinity. With the exception of molybdenum, these metals are not associated with past manufacturing processes at the site.

## Deep Aquifer

Condition number 2 of Section V.C.(1)(c)(iv) of the permit states that quarterly groundwater quality monitoring of the deep aquifer can be discontinued if deep aquifer wells meet the Groundwater Protection Standards (GWPS), or an approved Alternate Concentration Limit, for four consecutive quarters. There were no GWPS exceedences in any deep aquifer well during all four 1994 quarterly sampling events; therefore, condition number 2 was satisfied and quarterly deep aquifer water quality monitoring ceased in October 1994.

## MW-030(I)

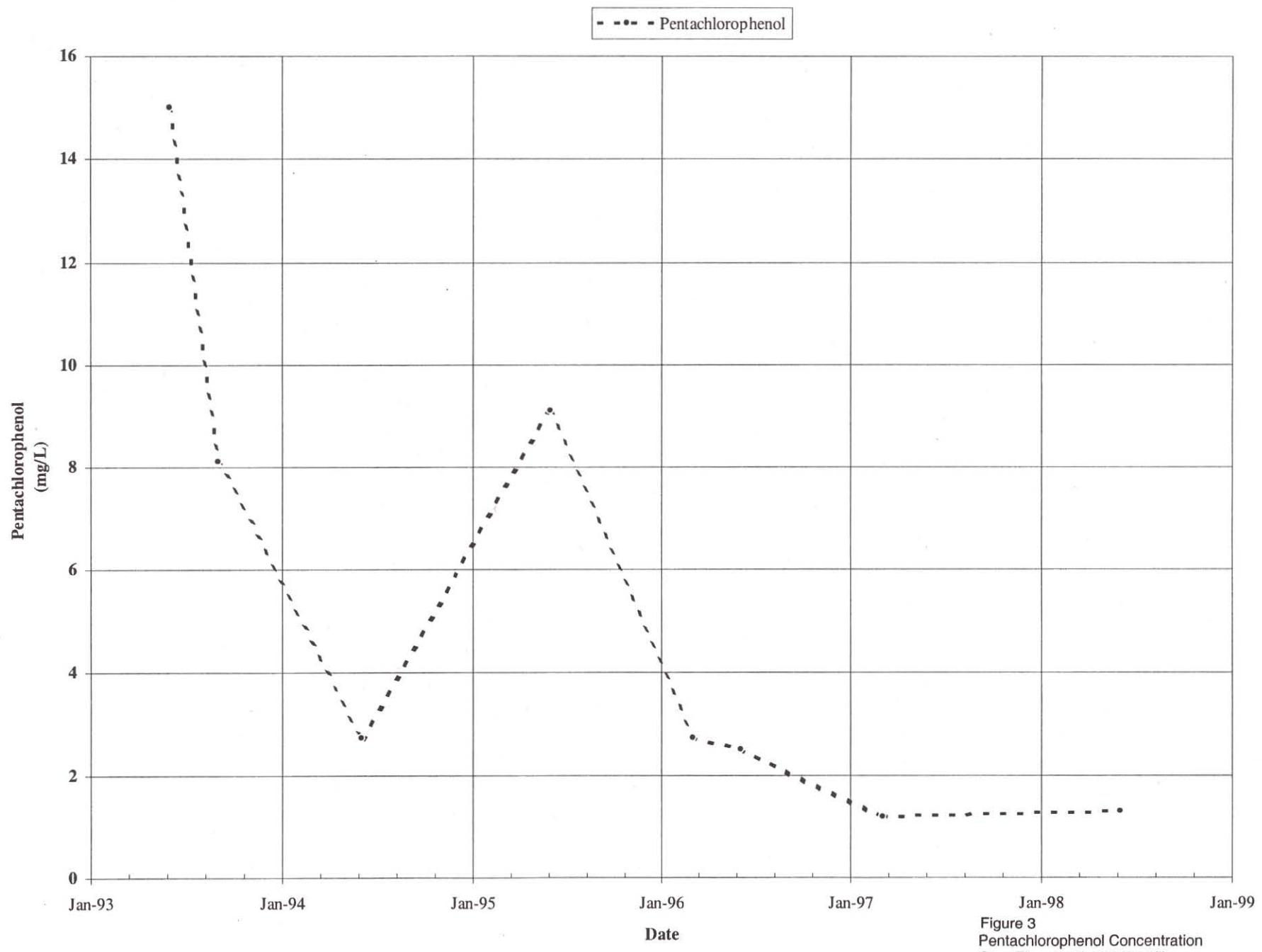


Figure 3  
Pentachlorophenol Concentration  
Over Time in Well MW-30(I)  
Reichhold, Inc., Tacoma Site

## Water Treatment System Influent

The water treatment system influent was analyzed for modified Appendix IX constituents (Table 6 of Reichhold's RCRA permit). Analytical results are provided in Attachment 3.

- Of the 142 constituents analyzed, 105 were not detected above their detection limit. Of the 37 constituents which had detectable concentrations, only the following nine constituents exceeded their respective GWPS; antimony, arsenic, manganese, 2,4,6-trichlorophenol, pentachlorophenol, benzene, tetrachloroethene, trichloroethene, and vinyl chloride.
- With the exception of tetrachloroethene, the constituents exceeding their GWPS in the water treatment system influent are generally consistent with the constituents exceeding GWPS in the shallow and intermediate aquifer CAMP wells.
- Aroclor 1248 was not detected (detection limit 1 $\mu$ g/L) in the water treatment system influent.

**TABLE 1**  
Proportion of CAMP Monitoring Wells Meeting GWPS

*Reichhold Inc. July 1998 Quarterly Results*

Constituent	Shallow Aquifer	Intermediate Aquifer
	Inorganic Compounds	
Antimony	50% (2 of 4)	26% (5 of 19)
Arsenic	100% (4 of 4)	95% (18 of 19)
Barium	100% (4 of 4)	100% (19 of 19)
Beryllium	100% (4 of 4)	100% (19 of 19)
Cadmium	100% (4 of 4)	95% (18 of 19)
Chromium	100% (4 of 4)	84% (16 of 19)
Cobalt	100% (4 of 4)	100% (19 of 19)
Copper	25% (1 of 4)	47% (9 of 19)
Cyanide	100% (4 of 4)	95% (18 of 19)
Cyanide, Amenable	100% (4 of 4)	100% (19 of 19)
Lead	100% (4 of 4)	100% (19 of 19)
Manganese	50% (2 of 4)	47% (9 of 19)
Mercury	100% (4 of 4)	100% (19 of 19)
Molybdenum	75% (3 of 4)	95% (18 of 19)
Nickel	75% (3 of 4)	100% (19 of 19)
Silver	100% (4 of 4)	100% (19 of 19)
Vanadium	100% (4 of 4)	100% (19 of 19)
Zinc	75% (3 of 4)	95% (18 of 19)

**TABLE 1**

Proportion of CAMP Monitoring Wells Meeting GWPS

*Reichhold Inc. July 1998 Quarterly Results*

Constituent	Shallow Aquifer	Intermediate Aquifer
<b>PCBs</b>		
Aroclor 1248	100% (3 of 3)	100% (19 of 19)
<b>Semivolatile Organic Compounds</b>		
2,3,4,6-Tetrachlorophenol	100% (4 of 4)	100% (19 of 19)
2,4,6-Trichlorophenol	75% (3 of 4)	100% (19 of 19)
2,4-Dichlorophenol	75% (3 of 4)	100% (19 of 19)
2-Benzyl-4-chlorophenol	100% (4 of 4)	100% (19 of 19)
2-Chlorophenol	100% (4 of 4)	100% (19 of 19)
2-Methylnaphthalene	100% (4 of 4)	100% (19 of 19)
2-Methylphenol	100% (4 of 4)	100% (19 of 19)
4-Chlorophenol 3-Methylphenol	100% (4 of 4)	100% (19 of 19)
4-Methylphenol	100% (4 of 4)	100% (19 of 19)
4(1,1-Dimethylethyl) phenol	100% (4 of 4)	100% (19 of 19)
Acenaphthene	100% (4 of 4)	100% (19 of 19)
Benzoic Acid	100% (4 of 4)	100% (19 of 19)
Bis(2-ethylhexyl)phthalate	100% (4 of 4)	100% (19 of 19)
Di-n-octyphthalate	100% (4 of 4)	100% (19 of 19)
Naphthalene	100% (4 of 4)	100% (19 of 19)
Pentachlorophenol	75% (3 of 4)	89% (17 of 19)
Phenol	100% (4 of 4)	100% (19 of 19)
<b>Volatile Organic Compounds</b>		
1,1-Dichloroethane	100% (7 of 7)	100% (19 of 19)
4-Methyl-2-pentanone	100% (7 of 7)	100% (19 of 19)
Acetone	100% (7 of 7)	100% (19 of 19)
Benzene	100% (7 of 7)	89% (17 of 19)
Ethylbenzene	100% (7 of 7)	100% (19 of 19)
Formaldehyde	83% (5 of 6)	74% (14 of 19)
Methylene Chloride	100% (7 of 7)	100% (19 of 19)
Tetrachloroethene	100% (7 of 7)	100% (19 of 19)
Toulene	100% (7 of 7)	100% (19 of 19)
Trans-1,2-dichloroethene	100% (7 of 7)	100% (19 of 19)
Trichloroethene	71% (5 of 7)	95% (18 of 19)
Trichlorofluoromethane	100% (7 of 7)	100% (19 of 19)
Vinyl chloride	100% (7 of 7)	95% (18 of 19)

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**Attachment 1: Water Level Elevation Data**



**Attachment 1**  
**Water Elevation Data - 21st Quarter of CAMP, July 21, 1998**  
**Reichhold, Incorporated**

Station ID	Measurement		Water Elevation	Units	Comments
	Time	Serial Time			
MW-001(D)	10:13:00	37010.00	2.16	FT-NGVD	
MW-001(I)	10:11:00	37008.00	1.35	FT-NGVD	
MW-001(S)	08:42:00	36839.00	5.59	FT-NGVD	
MW-002(I)	09:49:00	36946.00	1.37	FT-NGVD	
MW-002(S)2	08:46:00	36843.00	DRY	FT-NGVD	DRY
MW-003(I)	10:05:00	37002.00	0.84	FT-NGVD	
MW-003(S)	08:52:00	36849.00	6.27	FT-NGVD	
MW-004(D)	09:41:00	36938.00	2.21	FT-NGVD	
MW-004(I)2	09:42:00	36939.00	0.77	FT-NGVD	
MW-004(S)	09:07:00	36904.00	4.47	FT-NGVD	
MW-005(I)	09:34:00	36931.00	2.21	FT-NGVD	
MW-005(S)	08:58:00	36855.00	DRY	FT-NGVD	DRY
MW-006(I)	09:43:00	36940.00	1.33	FT-NGVD	
MW-006(S)	09:50:00	36847.00	5.88	FT-NGVD	
MW-007(D)	10:02:00	36007.02	2.35	FT-NGVD	
MW-007(I)	10:00:00	36997.00	1.81	FT-NGVD	
MW-008(I)	10:18:00	37015.00	0.13	FT-NGVD	
MW-008(S)	10:19:00	37016.00	7.16	FT-NGVD	
MW-009(I)	10:22:00	37019.00	1.87	FT-NGVD	
MW-009(S)	09:12:00	36909.00	DRY	FT-NGVD	DRY
MW-010(D)2	10:16:00	37013.00	1.00	FT-NGVD	
MW-010(I)	10:00:00	36997.00	0.53	FT-NGVD	
MW-010(S)	08:45:00	36842.00	2.52	FT-NGVD	
MW-011(D)2	10:21:00	37018.00	0.99	FT-NGVD	
MW-011(I)2	10:22:00	37019.00	-0.17	FT-NGVD	
MW-011(S)2	08:50:00	36847.00	DRY	FT-NGVD	DRY - resurveyed 5/15/96
MW-012(I)	10:26:00	37023.00	2.39	FT-NGVD	
MW-012(S)	09:00:00	36897.00	2.45	FT-NGVD	
MW-013(D)	09:45:00	36942.00	1.37	FT-NGVD	
MW-013(I)	09:43:00	36940.00	1.47	FT-NGVD	
MW-013(S)	08:45:00	36842.00	5.69	FT-NGVD	
MW-014(D)	09:55:00	36952.00	2.16	FT-NGVD	
MW-014(I)	09:53:00	36950.00	1.22	FT-NGVD	
MW-014(S)	09:14:00	36911.00	6.24	FT-NGVD	
MW-015(I)	09:58:00	36955.00	1.53	FT-NGVD	
MW-015(S)	11:15:00	37112.00	6.57	FT-NGVD	
MW-016(I)	10:25:00	37022.00	2.35	FT-NGVD	
MW-016(S)	10:29:00	37026.00	6.08	FT-NGVD	
MW-017(I)	10:16:00	37013.00	2.29	FT-NGVD	
MW-017(S)	11:12:00	37109.00	4.51	FT-NGVD	
MW-018(I)	10:05:00	37002.00	1.82	FT-NGVD	

**Water Elevation Data - 21st Quarter of CAMP, July 21, 1998**  
**Reichhold, Incorporated**

Station ID	Measurement		Water		
	Time	Serial Time	Elevation	Units	Comments
MW-019(I)	09:55:00	36952.00	0.75	FT-NGVD	resurveyed 10/29/96
MW-019(S)	11:18:00	37115.00	6.69	FT-NGVD	resurveyed 10/29/96
MW-020(I)	10:10:00	37007.00	1.07	FT-NGVD	resurveyed 10/29/96
MW-020(S)	11:10:00	37107.00	3.95	FT-NGVD	resurveyed 10/29/96
MW-021(I)	10:05:00	37002.00	2.25	FT-NGVD	resurveyed 10/29/96
MW-021(S)2	10:55:00	37052.00	5.24	FT-NGVD	resurveyed 10/29/96
MW-022(D)	10:12:00	37009.00	2.36	FT-NGVD	
MW-022(I)	10:10:00	37007.00	2.60	FT-NGVD	
MW-022(S)	10:15:00	37012.00	5.78	FT-NGVD	
MW-023(S)2	11:05:00	37102.00	6.66	FT-NGVD	
MW-024(S)	10:11:00	37008.00	5.43	FT-NGVD	
MW-025(S)2	08:56:00	36853.00	5.83	FT-NGVD	installed 11/18/96
MW-026(S)	09:48:00	36945.00	8.00	FT-NGVD	
MW-027(S)	09:01:00	36898.00	5.12	FT-NGVD	
MW-028(I)	09:51:00	36948.00	0.76	FT-NGVD	
MW-029(I)	09:49:00	36946.00	0.91	FT-NGVD	
MW-030(I)	09:45:00	36942.00	0.01	FT-NGVD	
MW-032(S)	09:22:00	36919.00	3.05	FT-NGVD	
MW-033(S)	09:17:00	36914.00	2.56	FT-NGVD	
MW-035(S)	09:09:00	36906.00	1.47	FT-NGVD	
MW-036(I)	09:26:00	36923.00	1.55	FT-NGVD	
MW-037(I)	10:03:00	37000.00	0.95	FT-NGVD	
MW-038(I)	10:10:00	37007.00	1.44	FT-NGVD	
MW-039(I)	09:31:00	36928.00	1.40	FT-NGVD	resurveyed 5/15/96
MW-040(D)	09:53:00	36950.00	1.42	FT-NGVD	
MW-040(I)	09:48:00	36945.00	-2.12	FT-NGVD	resurveyed 5/15/96
MW-041(I)	09:36:00	36933.00	0.71	FT-NGVD	
MW-042(S)2	09:06:00	36903.00	4.45	FT-NGVD	
MW-043(S)	08:56:00	36893.00	3.99	FT-NGVD	
MW-044(I)	09:31:00	36928.00	-4.97	FT-NGVD	resurveyed 5/15/96
MW-045(I)	09:25:00	36922.00	-1.28	FT-NGVD	
MW-046(I)	09:40:00	36937.00	1.03	FT-NGVD	resurveyed 5/15/96
MW-047(I)	09:42:00	36939.00	-2.59	FT-NGVD	resurveyed 5/15/96
MW-048(I)	10:09:00	37006.00	1.33	FT-NGVD	
MW-049(D)	09:51:00	36948.00	2.31	FT-NGVD	
MW-050(I)	09:35:00	36932.00	1.78	FT-NGVD	resurveyed 10/29/96
MW-051(S)	09:20:00	36917.00	DRY	FT-NGVD	DRY
MW-052(S)	09:04:00	36901.00	4.71	FT-NGVD	resurveyed 10/29/96
MW-053(D)	10:01:00	36998.00	2.36	FT-NGVD	
MW-053(I)	09:59:00	36956.00	1.67	FT-NGVD	
MW-054(S)	09:02:00	36899.00	DRY	FT-NGVD	DRY
MW-055(S)	08:53:00	36850.00	DRY	FT-NGVD	DRY

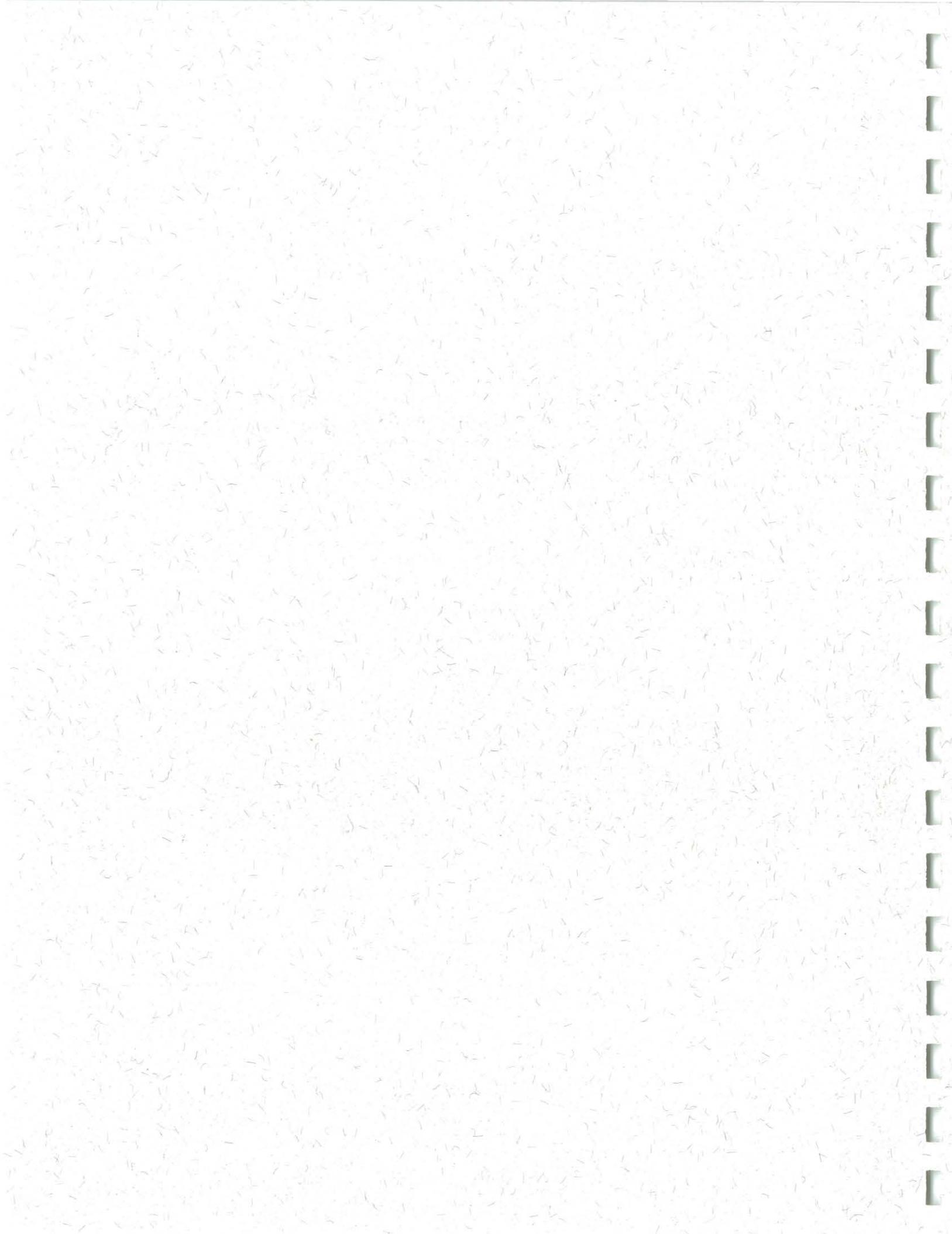
**Water Elevation Data - 21st Quarter of CAMP, July 21, 1998**  
**Reichhold, Incorporated**

Station ID	Measurement Time	Serial Time	Water Elevation	Units	Comments
MW-056(S)	10:52:00	37049.00	4.02	FT-NGVD	
MW-057(S)	11:07:00	37104.00	DRY	FT-NGVD	DRY
MW-058(I)	10:20:00	37017.00	2.14	FT-NGVD	
MW-058(S)	09:07:00	36904.00	DRY	FT-NGVD	DRY
MW-059(I)	09:53:00	36950.00	1.07	FT-NGVD	
MW-060(D)	09:29:00	36926.00	1.85	FT-NGVD	
PZ1(I)	10:00:00	36997.00	0.11	FT-NGVD	
PZ2(I)	09:55:00	36952.00	0.53	FT-NGVD	
PZ3(S)	09:09:00	36906.00	DRY	FT-NGVD	DRY
PZ4(S)	10:20:00	37017.00	5.88	FT-NGVD	
PZ5(S)	10:59:00	37056.00	5.99	FT-NGVD	
PZ6(S)	11:12:00	37109.00	DRY	FT-NGVD	DRY
PZ7(S)	11:10:00	37107.00	DRY	FT-NGVD	DRY
EW-3	10:31:00	37028.00	-1.69	FT-NGVD	
EW-4	09:30:00	36927.00	-12.29	FT-NGVD	
EW-5	10:23:00	37020.00	-1.11	FT-NGVD	
EW-6	10:01:00	36998.00	-2.76	FT-NGVD	
EW-7	09:57:00	36954.00	-2.83	FT-NGVD	
EW-8	10:25:00	37022.00	-2.68	FT-NGVD	
EW-9	09:50:00	36947.00	-12.01	FT-NGVD	
EW-10	09:26:00	36923.00	-12.53	FT-NGVD	
BLAIR	09:25:00	36922.00	-7.52	FT-NGVD	stilling well on Weyerhaeuser dock
SG-01	08:49:00	36846.00	3.64	FT-NGVD	
SG-07	08:57:00	36854	DRY	FT-NGVD	DRY
SG-08	10:33:00	37030.00	DRY	FT-NGVD	DRY
SG-09	09:31:00	35997	8.99	FT-NGVD	
SID-PZ-01	08:40:00	36837.00	DRY	FT-NGVD	DRY
SID-PZ-02	10:53:00	37050.00	4.63	FT-NGVD	
SID-PZ-03	10:57:00	37054.00	DRY	FT-NGVD	DRY
SID-PZ-04	11:03:00	37100.00	4.63	FT-NGVD	
SID-PZ-05	11:16:00	37113.00	3.12	FT-NGVD	
SID-PZ-06	11:30:00	37127.00	5.26	FT-NGVD	
SID-PZ-07	11:27:00	37124.00	6.14	FT-NGVD	
SID-PZ-08	11:23:00	37120.00	5.61	FT-NGVD	
SID-PZ-09	11:05:00	37102.00	DRY	FT-NGVD	DRY
SID-PZ-10	10:58:00	37055.00	4.00	FT-NGVD	
SID-PZ-11	11:18:00	37115.00	5.44	FT-NGVD	
SID-PZ-12	11:04:00	37101.00	4.52	FT-NGVD	
SID-PZ-13	10:57:00	37054.00	1.11	FT-NGVD	
SID-PZ-14	09:12:00	36909.00	DRY	FT-NGVD	DRY
SID-PZ-15	09:02:00	36899.00	2.84	FT-NGVD	new well, surveyed 10/29/96



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## **Attachment 2: Monitoring Well Analytical Results**



**Attachment 2****ANALYTICAL RESULTS**

(Required Parameters Listed in Table 7 of  
**Reichhold Part B Permit No. WAD 009 252 891)**

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-1(S)	MW-1(S)-FD	MW-4(S)	MW-12(S)	MW-14(S)	MW-21(S)2	MW-42(S)2	MW-56(S)	MW-2(I)	MW-4(I)2	MW-7(I)
<b>INORGANICS (ug/L)</b>													
ANTIMONY <sup>d</sup>	8.6	6	10.2 U	10.2 U			13.8 B	13.5 B		10.2 U	20.7 B	10.2 U	102 U
ARSENIC	5	50	0.8 U	0.8 U			0.8 U	1.7 B		0.8 U	0.8 U	3.6 B	12.2
BARIUM	1.7	2000	1.3 B	1.4 B			21.1 B	7.5 B		2.7 B	36.1 B	22.5 B	46.6 B
BERYLLIUM	0.3	4	0.1 U	0.1 U			0.54 B	3.7 B		0.39 B	0.35 B	0.61 B	1.1 B
CADMUM	1.2	10	0.98 B	0.9 U			0.9 U	8.5		0.9 U	0.9 U	0.9 U	9 U
CHROMIUM	2	50	1.9 U	1.9 U			1.9 U	1.9 U		1.9 U	5.2 B	67.8	58.4 B
COBALT	2.3	365	5.1 U	5.1 U			5.1 U	94.9		45.8 B	5.1 U	5.1 U	51 U
COPPER	1.1	2.9	2.6 B	1.4 B			15.4 B	6.6 B		24.9 B	2.9 B	13 B	12.2 B
CYANIDE	1	200	10 U	10 U			10 U	10 U		10 U	10 U	10 U	10 U
CYANIDE, AMENABLE	1	200	10 U	10 U			10 U	10 U		10 U	10 U	10 U	10 U
LEAD	5	50	0.5 B	0.3 U			1.6 B	4.1		0.3 U	0.6 BV	1.4 BW	4
MANGANESE	19.7	536-763 <sup>c</sup>	24.8	26.6			1620	1440		92	759	845	597
MERCURY	0.1	2	0.1 U	0.1 U			0.5 UN*	0.1 U		0.16 B	0.1 U	0.1 U	0.11 B
MOLYBDENUM	2.2	182	5 B	5 B			7.2 B	1.8 U		1830	79.8	9.5 B	18 U
NICKEL	7.3	100	6.1 B	4.4 U			5.3 B	215		23.5 B	4.4 U	4.4 U	44 U
SILVER	2.5	50	2.5 B	2.3 U			2.3 U	2.4 B		2.3 U	2.3 U	2.3 U	23 U
VANADIUM	1.2	700	2.4 B	1.7 B			6 B	7.9 B		1.7 B	23.2 B	299	304 B
ZINC	1.1	86	6.2 B	4.9 B			43	368		59.4	3.7 B	8.1 B	8.9 B
<b>PCBs (ug/L)</b>													
AROCLOR - 1248 <sup>d</sup>	1	0.5	1 U	1 U			1 U			1 U	1 U	1 U	1 U
<b>SEMIVOLATILE ANALYSIS (ug/L)</b>													
2,3,4,6-TETRACHLOROPHENOL	10	10000	10 U	10 U			8400 D	10 U		10 U	10 U	10 U	10 U
2,4,6-TRICHLOROPHENOL <sup>d</sup>	10	1	10 U	10 U			11000 D	10 U		10 U	10 U	10 U	10 U

11/18/98

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**Attachment 2****ANALYTICAL RESULTS**

(Required Parameters Listed in Table 7 of  
**Reichhold Part B Permit No. WAD 009 252 891**)

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-1(S)	MW-1(S)-FD	MW-4(S)	MW-12(S)	MW-14(S)	MW-21(S)2	MW-42(S)2	MW-56(S)	MW-2(I)	MW-4(I)2	MW-7(I)
2,4-DICHLOROPHENOL	10	100	10 U	10 U			490 D	10 U		10 U	10 U	10 U	10 U
2-BENZYL-4-CHLOROPHENOL	10	10	10 U	10 U			8 J	10 U		10 U	10 U	10 U	10 U
2-CHLOROPHENOL	10	200	10 U	10 U			140 D	10 U		10 U	10 U	10 U	10 U
2-METHYLNAPHTHALENE	10	10	10 U	10 U			10 U	10 U		10 U	10 U	10 U	10 U
2-METHYLPHENOL	10	2000	10 U	10 U			4 J	10 U		10 U	10 U	10 U	10 U
4-TERT-BUTYLPHENOL	10	1000	10 U	10 U			610 D	10 U		10 U	10 U	10	10 U
4-METHYLPHENOL	10	2000	10 U	10 U			30	10 U		10 U	10 U	10 U	10 U
4-CHLORO-3-METHYLPHENOL	10	30	10 U	10 U			10 U	10 U		10 U	10 U	10 U	10 U
ACENAPHTHENE	10	2000	10 U	10 U			10 U	10 U		10 U	10 U	10 U	10 U
BENZOIC ACID	50	146000	50 U	50 U			38 J	50 U		50 U	50 U	50 U	50 U
BIS(2-ETHYLHEXYL)PHTHALATE <sup>d</sup>	10	6	10 U	10 U			10 U	10 U		10 U	10 U	88 D	10 U
DI-N-OCTYLPHTHALATE	10	700	10 U	10 U			10 U	10 U		10 U	10 U	10 U	10 U
NAPHTHALENE	10	1000	10 U	10 U			10 U	10 U		10 U	10 U	10 U	10 U
PENTACHLOROPHENOL <sup>d</sup>	25	1	25 U	25 U			15000 D	25 U		25 U	25 U	25 U	25 U
PHENOL	10	1000	10 U	10 U			760 D	10 U		10 U	10 U	10 U	10 U
<b>VOLATILE ANALYSIS (ug/L)</b>													
TRICHLOROFLUOROMETHANE	10	22500	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
FORMALDEHYDE	20	50	20 U	20 U	20 U	20 U	25	72		20 U	20 U	35	48
TRANS-1,2-DICHLOROETHENE	5	100	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	5	1000	5 U	5 U	5 U	5 U	53	5 U	5 U	5 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	10	1000	10 U	10 U	10 U	10 U	7 J	10 U	10 U	10 U	10 U	10 U	10 U
ACETONE	10	3500	10 U	10 U	10	10 U	72	10 U	5 J	6 J	10 U	10 U	11
BENZENE	5	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2 J	5 U	5 U
ETHYLBENZENE	5	700	5 U	5 U	5 U	5 U	17	5 U	5 U	5 U	5 U	5 U	5 U

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Attachment 2

ANALYTICAL RESULTS

(Required Parameters Listed in Table 7 of  
Reichhold Part B Permit No. WAD 009 252 891)

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-1(S)	MW-1(S)-FD	MW-4(S)	MW-12(S)	MW-14(S)	MW-21(S)2	MW-42(S)2	MW-56(S)	MW-2(I)	MW-4(I)2	MW-7(I)
METHYLENE CHLORIDE	5	5	5 U	5 U	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5	5	5 U	5 U	5 U	5 U	24	5 U	8	1 J	5 U	5 U	5 U
TETRACHLOROETHENE	5	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2 J	5 U	5 U	5 U
TOLUENE	5	1000	5 U	5 U	5 U	5 U	2 J	5 U	5 U	5 U	5 U	5 U	5 U
VINYL CHLORIDE	2	2	2 U	2 U	2 U	2 U	2	2 U	2 U	2 U	2 U	2 U	2 U

<sup>a</sup>EPA contract required detection limits (CLP, 1988)

Data Qualifiers:

U=Parameter analyzed for but not detected above the concentration listed.

J=Indicated an estimated value.

B=(Inorganic compounds) The reported value obtained was less than the Contract Required Detection Limit (CRDL), but equal or greater to the Instrument Detection Limit (IDL).

D=(Organic compounds) Indicates compounds which have been identified during a diluted reanalysis.

W=Graphite furnace analytical spike not within control limits (85% - 115%).

N=Spiked sample recovery not within control limits.

<sup>b</sup> Groundwater Protection Standard from Table 7 of Permit WAD009252891.

<sup>c</sup> GWPS for shallow aquifer-536 ug/L; GWPS for intermediate aquifer-763 ug/L

<sup>d</sup>Estimated value below detection limit reported because GWPS is below detection limit.

Subsample: FD = Field Duplicate

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Page 3 of 9

July 1998 water quality.xls

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**Attachment 2****ANALYTICAL RESULTS**

(Required Parameters Listed in Table 7 of  
**Reichhold Part B Permit No. WAD 009 252 891)**

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-12(I)	MW-16(I)	MW-17(I)	MW-22(I)	MW-28(I)	MW-30(I)	MW-30(I)-FD	MW-36(I)	MW-37(I)
<b>INORGANICS (ug/L)</b>											
ANTIMONY <sup>d</sup>	8.6	6	31.9 B	102 U	200 B	102 U	33.8 B	14.7 B	10.2 U	43.1 B	13 B
ARSENIC	5	50	0.8 U	0.8 U	8 U	1.2 BW	0.8 U	5.6 B	5.8 B	1.2 B	3.3 B
BARIUM	1.7	2000	155 B	24.2 B	47.5 B	51.4 B	75.4 B	58 B	56.1 B	29.9 B	21.9 B
BERYLLIUM	0.3	4	0.3 B	1 U	1 U	1 U	0.1 U	0.19 B	0.34 B	0.15 B	0.52 B
CADMIUM	1.2	10	2 B	9 U	9.4 B	9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
CHROMIUM	2	50	1.9 U	19 U	19 U	19 U	1.9 U	3 B	1.9 U	3.6 B	80.9
COBALT	2.3	365	5.1 U	51 U	51 U	51 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U
COPPER	1.1	2.9	2.3 B	11 U	21.4 B	12.2 B	4.3 B	3.9 B	1.3 B	1.1 U	13.9 B
CYANIDE	1	200	10 U	360	97	10 U	10 U	10 U	10 U	10 U	10 U
CYANIDE, AMENABLE	1	200	10 U	10 U	10 U						
LEAD	5	50	7 BM	0.7 BW	3 U	3 U	6 BM	0.3 U	1 B	7 B	0.6 BW
MANGANESE	19.7	536-763 <sup>c</sup>	3500	312	345	993	1470	557	544	70.8	567
MERCURY	0.1	2	0.5 UN*	0.1 U	0.1 U	0.1 U	0.6 BN*	0.1 U	0.1 U	0.5 U	0.1 U
MOLYBDENUM	2.2	182	1.8 U	18 U	18 U	18 U	8.7 B	115	114	1.8 U	1.8 U
NICKEL	7.3	100	4.4 U	44 U	44 U	44 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
SILVER	2.5	50	2.3 U	23 U	23.4 B	23 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
VANADIUM	1.2	700	11.3 B	46.1 B	28.8 B	37.4 B	12.6 B	26.8 B	26.6 B	45.3 B	272
ZINC	1.1	86	3.3 B	11 B	13.1 B	6.8 B	298	5 B	2.9 B	2.4 B	7.5 B
<b>PCBs (ug/L)</b>											
AROCLOR - 1248 <sup>d</sup>	1	0.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	20 U	1 U
<b>SEMIVOLATILE ANALYSIS (ug/L)</b>											
2,3,4,6-TETRACHLOROPHENOL	10	10000	10 U	170 D	210 D	10 U	10 U				
2,4,6-TRICHLOROPHENOL <sup>d</sup>	10	1	10 U	4 J	4 J	10 U	10 U				

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**Attachment 2****ANALYTICAL RESULTS**

(Required Parameters Listed in Table 7 of  
**Reichhold Part B Permit No. WAD 009 252 891)**

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-12(I)	MW-16(I)	MW-17(I)	MW-22(I)	MW-28(I)	MW-30(I)	MW-30(I)-FD	MW-36(I)	MW-37(I)
2,4-DICHLOROPHENOL	10	100	10 U	24	26	10 U	10 U				
2-BENZYL-4-CHLOROPHENOL	10	10	10 U	10 U	10 U						
2-CHLOROPHENOL	10	200	10 U	9 J	10 J	10 U	10 U				
2-METHYLNAPHTHALENE	10	10	10 U	10 U	10 U						
2-METHYLPHENOL	10	2000	10 U	4 J	5 J	10 U	10 U				
4-TERT-BUTYLPHENOL	10	1000	10 U	21	22	10 U	10 U				
4-METHYLPHENOL	10	2000	10 U	3 J	4 J	10 U	10 U				
4-CHLORO-3-METHYLPHENOL	10	30	10 U	10 U	10 U						
ACENAPHTHENE	10	2000	10 U	10 U	4 J						
BENZOIC ACID	50	146000	50 U	12 J	50 U	50 U	50 U				
BIS(2-ETHYLHEXYL)PHTHALATE <sup>d</sup>	10	6	10 U	10 U	10 U						
DI-N-OCTYLPHthalate	10	700	10 U	10 U	10 U						
NAPHTHALENE	10	1000	10 U	10 U	10 U						
PENTACHLOROPHENOL <sup>d</sup>	25	1	25 U	1100 D	1500 D	25 U	25 U				
PHENOL	10	1000	10 U	1 J	1 J	10 U	10 U				
<b>VOLATILE ANALYSIS (ug/L)</b>											
TRICHLOROFLUOROMETHANE	10	22500	10 U	10 U	10 U						
FORMALDEHYDE	20	50	20 U	27	26	82	32				
TRANS-1,2-DICHLOROETHENE	5	100	5 U	5 U	5 U	5 U	5 U	1 J	1 J	5 U	5 U
1,1-DICHLOROETHANE	5	1000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	10	1000	10 U	10 U	10 U						
ACETONE	10	3500	10 U	10 U	10 U	7 J	10 U	10 U	10 U	10 U	5 J
BENZENE	5	5	5 U	5 U	5 U	5 U	5 U	10	10	5 U	5 U
ETHYLBENZENE	5	700	5 U	5 U	5 U	5 U	5 U	5	5	5 U	5 U

**Attachment 2****ANALYTICAL RESULTS**

(Required Parameters Listed in Table 7 of  
**Reichhold Part B Permit No. WAD 009 252 891)**

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-12(I)	MW-16(I)	MW-17(I)	MW-22(I)	MW-28(I)	MW-30(I)	MW-30(I)-FD	MW-36(I)	MW-37(I)
METHYLENE CHLORIDE	5	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5	5	5 U	5 U	5 U	5 U	5 U	20	21	5 U	5 U
TETRACHLOROETHENE	5	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TOLUENE	5	1000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
VINYL CHLORIDE	2	2	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

<sup>a</sup> EPA contract required detection limits (CLP, 1988)

Data Qualifiers:

U=Parameter analyzed for but not detected above the concentration listed.

J=Indicated an estimated value.

B=(Inorganic compounds) The reported value obtained was less than the Contract Required Detection Limit (CRDL), but equal or greater to the Instrument Detection Limit (IDL).

D=(Organic compounds) Indicates compounds which have been identified during a diluted reanalysis.

W=Graphite furnace analytical spike not within control limits (85% - 115%).

N=Spiked sample recovery not within control limits.

<sup>b</sup> Groundwater Protection Standard from Table 7 of Permit WAD009252

<sup>c</sup> GWPS for shallow aquifer-536 ug/L; GWPS for intermediate aquifer-763

<sup>d</sup>Estimated value below detection limit reported because GWPS is below detection limit.

Subsample: FD = Field Duplicate

**Attachment 2****ANALYTICAL RESULTS**

(Required Parameters Listed in Table 7 of  
**Reichhold Part B Permit No. WAD 009 252 891)**

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-39(l)	MW-41(l)	MW-44(l)	MW-45(l)	MW-46(l)	MW-48(l)	MW-48(l)-FD	MW-50(l)	MW-53(l)
<b>INORGANICS (ug/L)</b>											
ANTIMONY <sup>d</sup>	8.6	6	16 B	19.7 B	188 B	41 B	10.2 U	17.6 B	22.2 B	28.5 B	41.4 B
ARSENIC	5	50	1.2 B	0.8 U	8 U	9880	0.9 B	0.8 U	0.8 U	9.7 B	0.8 U
BARIUM	1.7	2000	126 B	14.9 B	71.8 B	25.5 B	19.8 B	27.5 B	28.7 B	28 B	171 B
BERYLLIUM	0.3	4	0.28 B	0.38 B	1.7 B	0.1 U	0.3 B	0.15 B	0.15 B	0.37 B	0.24 B
CADMIUM	1.2	10	1.2 B	0.9 U	10.4 B	0.9 U	0.9 U	1.7 B	1.3 B	2.4 B	4.9 B
CHROMIUM	2	50	11.5	1.9 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	15.7	1.9 U
COBALT	2.3	365	5.1 U	5.1 U	51 U	5.1 U	5.1 U	5.1 U	5.1 U	5.3 B	5.1 U
COPPER	1.1	2.9	2.3 B	1.1 U	12.2 B	1.1 U	2.1 B	2 B	5.5 B	7.6 B	4.5 B
CYANIDE	1	200	10 U	10 U	10 U						
CYANIDE, AMENABLE	1	200	10 U	10 U	10 U						
LEAD	5	50	0.6 B	5 B	4 BM	8 B	0.3 UV	0.3 U	0.3 B	3 B	4
MANGANESE	19.7	536-763 <sup>c</sup>	948	1350	2530	1030	707	504	519	855	6920
MERCURY	0.1	2	0.5 BN*	0.5 UN*	0.7 BN*	0.5 U	0.1 U	0.1 U	0.1 U	1.2	0.1 U
MOLYBDENUM	2.2	182	1.8 U	1.8 U	18 U	271	1.8 U	1220	1150	1.8 U	172
NICKEL	7.3	100	4.4 U	4.4 U	44 U	4.4 U	4.4 U	4.4 U	4.4 U	5.2 B	4.4 U
SILVER	2.5	50	2.3 U	2.3 U	26.9 B	2.3 U	2.3 U	3.5 B	2.8 B	4.1 B	2.3 U
VANADIUM	1.2	700	59.2	7 B	34.1 B	5.8 B	11.2 B	10.5 B	10 B	80.6	5.2 B
ZINC	1.1	86	2.7 B	1.6 B	7.4 B	1.5 B	4.3 B	4.3 B	5.3 B	4.2 B	2.6 B
<b>PCBs (ug/L)</b>											
AROCLOR - 1248 <sup>d</sup>	1	0.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
<b>SEMIVOLATILE ANALYSIS (ug/L)</b>											
2,3,4,6-TETRACHLOROPHENOL	10	10000	10 U	32	28	10 U	10 U				
2,4,6-TRICHLOROPHENOL <sup>d</sup>	10	1	10 U	6 J	5 J	10 U	10 U				

**Attachment 2****ANALYTICAL RESULTS**

(Required Parameters Listed in Table 7 of

Reichhold Part B Permit No. WAD 009 252 891)

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-39(I)	MW-41(I)	MW-44(I)	MW-45(I)	MW-46(I)	MW-48(I)	MW-48(I)-FD	MW-50(I)	MW-53(I)
2,4-DICHLOROPHENOL	10	100	10 U	8 J	6 J	10 U	10 U				
2-BENZYL-4-CHLOROPHENOL	10	10	10 U	10 U	10 U						
2-CHLOROPHENOL	10	200	10 U	4 J	3 J	10 U	10 U				
2-METHYLNAPHTHALENE	10	10	10 U	10 U	10 U						
2-METHYLPHENOL	10	2000	10 U	10 U	10 U						
4-TERT-BUTYLPHENOL	10	1000	10 U	5 J	5 J	10 U	10 U				
4-METHYLPHENOL	10	2000	10 U	10 U	10 U						
4-CHLORO-3-METHYLPHENOL	10	30	10 U	10 U	10 U						
ACENAPHTHENE	10	2000	10 U	10 U	10 U						
BENZOIC ACID	50	146000	50 U	50 U	50 U						
BIS(2-ETHYLHEXYL)PHTHALATE <sup>d</sup>	10	6	10 U	10 U	10 U	10 U	3 J	10 U	10 U	10 U	10 U
DI-N-OCTYLPHthalate	10	700	10 U	10 U	10 U						
NAPHTHALENE	10	1000	10 U	10 U	10 U						
PENTACHLOROPHENOL <sup>d</sup>	25	1	25 U	240 D	220 D	25 U	25 U				
PHENOL	10	1000	10 U	10 U	10 U						
<b>VOLATILE ANALYSIS (ug/L)</b>											
TRICHLOROFLUOROMETHANE	10	22500	10 U	10 U	10 U						
FORMALDEHYDE	20	50	110	20 U	20 U	20 U	23	88	74	160	53
TRANS-1,2-DICHLOROETHENE	5	100	5 U	5 U	5 U	5 U	5 U	39	51	5 U	11
1,1-DICHLOROETHANE	5	1000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	10	1000	10 U	10 U	10 U						
ACETONE	10	3500	11	10 U	10 U	10 U	11	10 U	15	10 U	10 U
BENZENE	5	5	5 U	5 U	5 U	5 U	5 U	9	8	5 U	5 U
ETHYLBENZENE	5	700	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U

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Attachment 2

**ANALYTICAL RESULTS**

(Required Parameters Listed in Table 7 of  
Reichhold Part B Permit No. WAD 009 252 891)

21st Quarter of CAMP -July, 1998

Reichhold, Incorporated

Lab Parameter	Detection Limit <sup>a</sup>	GWPS <sup>b</sup>	MW-39(I)	MW-41(I)	MW-44(I)	MW-45(I)	MW-46(I)	MW-48(I)	MW-48(I)-FD	MW-50(I)	MW-53(I)
METHYLENE CHLORIDE	5	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRICHLOROETHENE	5	5	5 U	5 U	5 U	5 U	5 U	4 J	4 J	5 U	5 U
TETRACHLOROETHENE	5	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TOLUENE	5	1000	5 U	5 U	5 U	5 U	5 U	1 J	1 J	5 U	5 U
VINYL CHLORIDE	2	2	2 U	2 U	2 U	2 U	2 U	180 D	210 D	2 U	2 U

<sup>a</sup> EPA contract required detection limits (CLP, 1988)

Data Qualifiers: U=Parameter analyzed for but not detected above the concentration listed.

J=Indicated an estimated value.

<sup>b</sup> Groundwater Protection Standard from Table 7 of Permit WAD009252

B=(Inorganic compounds) The reported value obtained was less than the Contract R Detection Limit (CRDL), but equal or greater to the Instrument Detection Limit (IDL)

<sup>c</sup> GWPS for shallow aquifer-536 ug/L; GWPS for intermediate aquifer-763

D=(Organic compounds) Indicates compounds which have been identified during c

W=Graphite furnace analytical spike not within control limits (85% - 115%).

<sup>d</sup>Estimated value below detection limit reported because GWPS

is below detection limit.

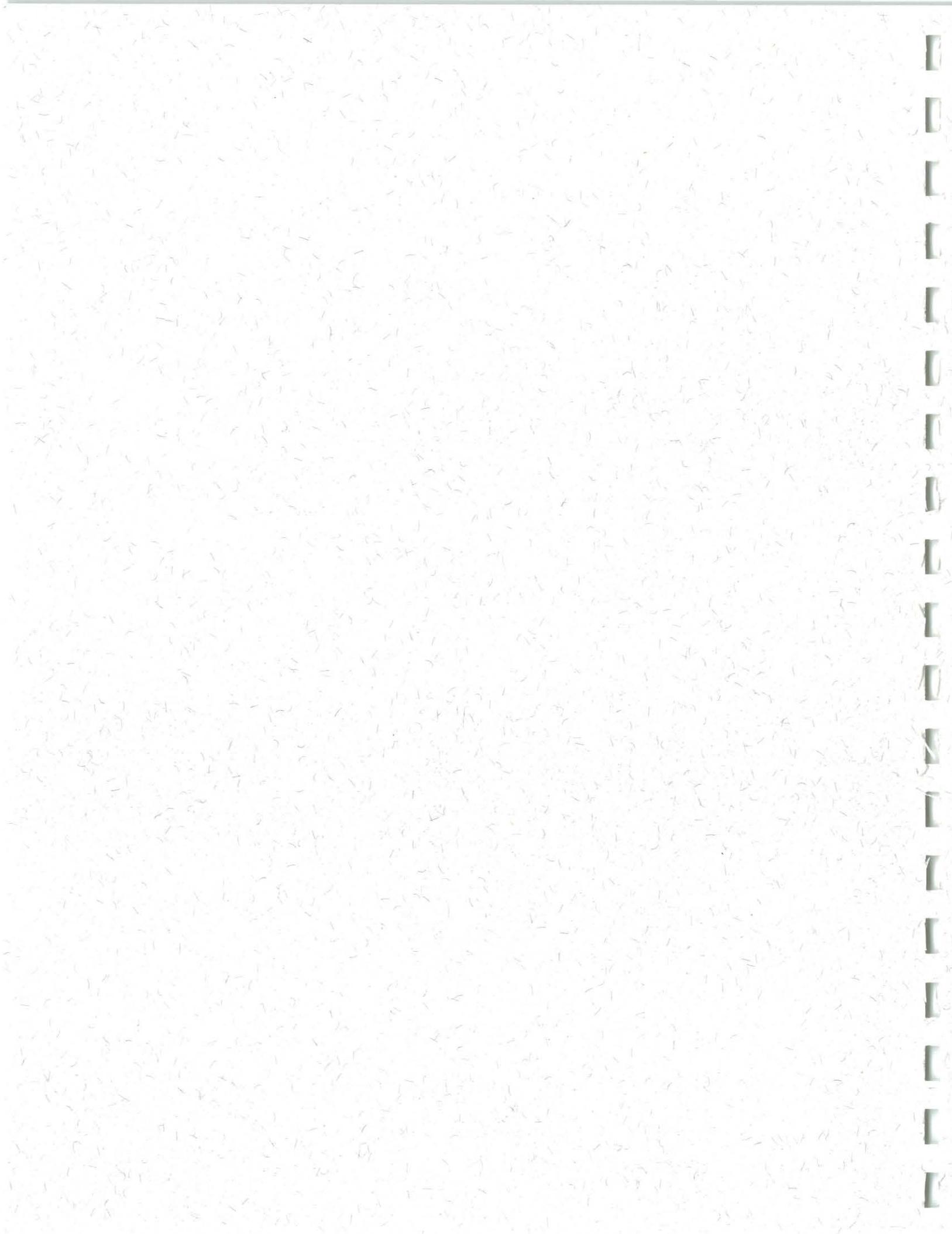
N=Spiked sample recovery not within control limits.

Subsample: FD = Field Duplicate



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### **Attachment 3: Water Treatment Plant Influent Analytical Results**



**Attachment 3**  
**Modified Appendix IX Results**  
**Water Treatment Plant Influent**  
**Reichhold, Incorporated**

	Value	Qualifier	Units
<b>CONVENTIONAL ANALYSES</b>			
TOTAL ORGANIC CARBON	11.6		mg/L
pH	6.69		Units
<b>INORGANIC ANALYSES</b>			
ALUMINUM	62.7	B	ug/L
ANTIMONY	23.6	B	ug/L
ARSENIC	493.		ug/L
BARIUM	83.5	B	ug/L
BERYLLIUM	.1	U	ug/L
CADMUM	.9	U	ug/L
CALCIUM	380000.		ug/L
CHROMIUM	1.9	U	ug/L
COBALT	5.1	U	ug/L
COPPER	1.2	B	ug/L
CYANIDE	10.	U	ug/L
CYANIDE, AMENABLE	10.	U	ug/L
IRON	31900.		ug/L
LEAD	1.5	U	ug/L
MAGNESIUM	151000.		ug/L
MANGANESE	1470.		ug/L
MERCURY	.1	U	ug/L
MOLYBDENUM	170.		ug/L
NICKEL	7.	B	ug/L
POTASSIUM	58400.		ug/L
SELENIUM	3.	U	ug/L
SILVER	2.3	U	ug/L
SODIUM	893000.		ug/L
THALLIUM	10.	U	ug/L
VANADIUM	21.2		ug/L
ZINC	20.2		ug/L
<b>PESTICIDES/PCB's ANALYSES</b>			
AROCLOR-1248	1.	U	ug/L
<b>SEMIVOLATILE ANALYSES</b>			
1,2,4-TRICHLOROBENZENE	10.	U	ug/L
1,2-DICHLOROBENZENE	10.	U	ug/L
1,3-DICHLOROBENZENE	10.	U	ug/L
1,4-DICHLOROBENZENE	10.	U	ug/L
2,3,4,6-TETRACHLOROPHENOL	140.	D	ug/L
2,3-DIMETHYLANILINE	10.	U	ug/L
2,4,5-TRICHLOROPHENOL	9.6	J	ug/L
2,4,6-TRICHLOROPHENOL	3.3	J	ug/L
2,4-DICHLOROPHENOL	8.3	J	ug/L

**Attachment 3**  
**Modified Appendix IX Results**  
**Water Treatment Plant Influent**  
**Reichhold, Incorporated**

	Value	Qualifier	Units
2,4-DIMETHYLANILINE	10.	U	ug/L
2,4-DIMETHYLPHENOL	10.	U	ug/L
2,4-DINITROPHENOL	25.	U	ug/L
2,4-DINITROTOLUENE	10.	U	ug/L
2,5-DIMETHYLANILINE	10.	U	ug/L
2,6-DIMETHYLANILINE	10.	U	ug/L
2,6-DINITROTOLUENE	10.	U	ug/L
2-BENZYL-4-CHLOROPHENOL	10.	U	ug/L
2-CHLORONAPHTHALENE	10.	U	ug/L
2-CHLOROPHENOL	37.		ug/L
2-METHYLNAPHTHALENE	10.	U	ug/L
2-METHYLPHENOL	10.	U	ug/L
2-NITROANILINE	25.	U	ug/L
2-NITROPHENOL	10.	U	ug/L
3,3'-DICHLOROBENZIDINE	10.	U	ug/L
3,4-DIMETHYLANILINE	10.	U	ug/L
3,5-DIMETHYLANILINE	10.	U	ug/L
3-NITROANILINE	25.	U	ug/L
4(1,1)-DIMETHYLETHYL PHENOL	35.		ug/L
4,6-DINITRO-2-METHYLPHENOL	25.	U	ug/L
4-BROMOPHENYL PHENYL ETHER	10.	U	ug/L
4-CHLORO-3-METHYLPHENOL	10.	U	ug/L
4-CHLOROANILINE	10.	U	ug/L
4-CHLOROPHENYL PHENYL ETHER	10.	U	ug/L
4-METHYLPHENOL	1.3	J	ug/L
4-NITROANILINE	25.	U	ug/L
4-NITROPHENOL	25.	U	ug/L
ACENAPHTHENE	10.	U	ug/L
ACENAPHTHYLENE	10.	U	ug/L
ANTHRACENE	10.	U	ug/L
BENZO(A)ANTHRACENE	10.	U	ug/L
BENZO(A)PYRENE	10.	U	ug/L
BENZO(B)FLUORANTHENE	10.	U	ug/L
BENZO(GHI)PERYLENE	10.	U	ug/L
BENZO(K)FLUORANTHENE	10.	U	ug/L
BENZOIC ACID	3.	J	ug/L
BENZYL ALCOHOL	10.	U	ug/L
BENZYL BUTYL PHTHALATE	10.	U	ug/L
BIS(2-CHLOROETHOXY) METHANE	10.	U	ug/L
BIS(2-CHLOROETHYL)ETHER	10.	U	ug/L
BIS(2-CHLOROISOPROPYL) ETHER	10.	U	ug/L
BIS(2-ETHYLHEXYL)PHTHALATE	10.	U	ug/L

**Attachment 3**  
**Modified Appendix IX Results**  
**Water Treatment Plant Influent**  
**Reichhold, Incorporated**

	<b>Value</b>	<b>Qualifier</b>	<b>Units</b>
CARBAZOLE	10.	U	ug/L
CHRYSENE	10.	U	ug/L
DI-N-BUTYL PHTHALATE	10.	U	ug/L
DI-N-OCTYL PHTHALATE	10.	U	ug/L
DIBENZO(A,H)ANTHRACENE	10.	U	ug/L
DIBENZOFURAN	10.	U	ug/L
DIETHYL PHTHALATE	10.	U	ug/L
DIMETHYL PHTHALATE	10.	U	ug/L
FLUORANTHENE	10.	U	ug/L
FLUORENE	10.	U	ug/L
HEXACHLOROBENZENE	10.	U	ug/L
HEXACHLOROBUTADIENE	10.	U	ug/L
HEXACHLOROCYCLOPENTADIENE	10.	U	ug/L
HEXACHLOROETHANE	10.	U	ug/L
INDENO(1,2,3-CD)PYRENE	10.	U	ug/L
ISOPHORONE	10.	U	ug/L
N,N-DIMETHYLBENZENAMINE	10.	U	ug/L
N-NITROSO-DI-N-PROPYLAMINE	10.	U	ug/L
N-NITROSODIPHENYLAMINE	10.	U	ug/L
NAPHTHALENE	10.	U	ug/L
NITROBENZENE	10.	U	ug/L
PENTACHLOROPHENOL	1500.	D	ug/L
PHENANTHRENE	10.	U	ug/L
PHENOL	62.		ug/L
PYRENE	10.	U	ug/L
<b>VOLATILE ANALYSES</b>			
1,1,1-TRICHLOROETHANE	72.		ug/L
1,1,2,2-TETRACHLOROETHANE	5.	U	ug/L
1,1,2-TRICHLOROETHANE	5.	U	ug/L
1,1-DICHLOROETHANE	5.	U	ug/L
1,1-DICHLOROETHENE	5.	U	ug/L
1,2-DICHLOROETHANE	5.	U	ug/L
1,2-DICHLOROETHENE (TOTAL)	87.		ug/L
1,2-DICHLOROPROPANE	5.	U	ug/L
2-BUTANONE	16.		ug/L
2-HEXANONE	10.	U	ug/L
4-METHYL-2-PENTANONE	10.	U	ug/L
ACETONE	10.	U	ug/L
BENZENE	7.		ug/L
BROMODICHLOROMETHANE	5.	U	ug/L
BROMOFORM	5.	U	ug/L
BROMOMETHANE	10.	U	ug/L

**Attachment 3**  
**Modified Appendix IX Results**  
**Water Treatment Plant Influent**  
**Reichhold, Incorporated**

	Value	Qualifier	Units
CARBON DISULFIDE	5.	U	ug/L
CARBON TETRACHLORIDE	5.	U	ug/L
CHLOROBENZENE	5.	U	ug/L
CHLORODIBROMOMETHANE	5.	U	ug/L
CHLOROETHANE	10.	U	ug/L
CHLOROFORM	5.	U	ug/L
CHLOROMETHANE	10.	U	ug/L
CIS-1,2-DICHLOROETHENE	5.	U	ug/L
CIS-1,3-DICHLOROPROPENE	5.	U	ug/L
ETHYLBENZENE	1.	J	ug/L
FORMALDEHYDE	32.		ug/L
METHYLENE CHLORIDE	5.	U	ug/L
STYRENE	5.	U	ug/L
TETRACHLOROETHENE	87.	D	ug/L
TOLUENE	1.	J	ug/L
TRANS-1,2-DICHLOROETHENE	5.	U	ug/L
TRANS-1,3-DICHLOROPROPENE	5.	U	ug/L
TRICHLOROETHENE	72.		ug/L
VINYL ACETATE	10.	U	ug/L
VINYL CHLORIDE	22.		ug/L
XYLENE (TOTAL)	5.	U	ug/L

Data Qualifiers: U = Parameter analyzed for but not detected above the concentration listed.

B = (Inorganic Compounds) the reported value obtained was less than the Contract Required Detection Limit (CRDL), but greater or equal to the Instrument Detection Limit (IDL).

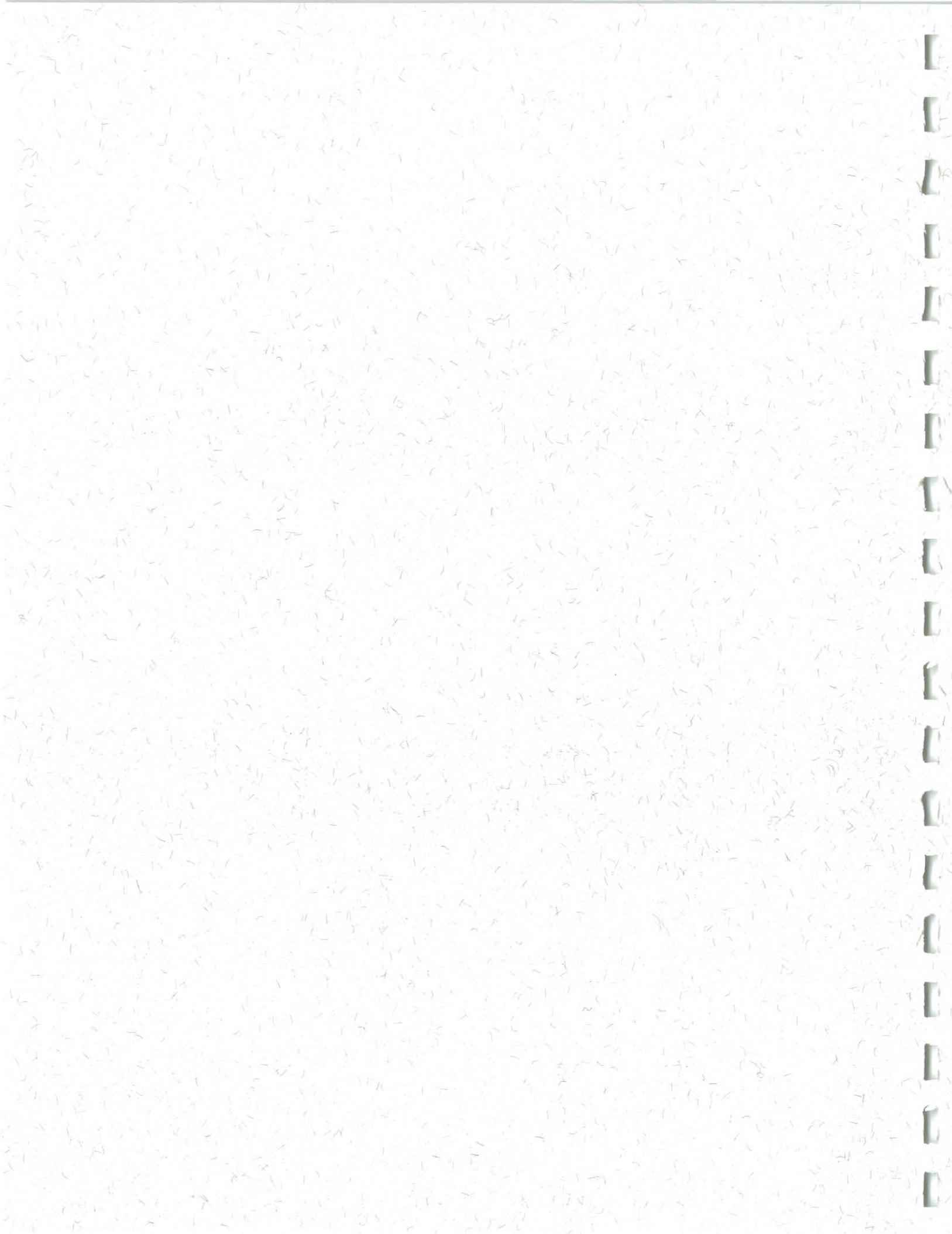
N= (Inorganic Compounds) spiked sample recovery not within control limits.

W= (Inorganic Compounds) graphite furnace analytical spike not within control limits (85% - 115%).

D = (Organic Compounds) Indicates compounds which have been identified during a diluted reanalysis.

J = Indicates an estimated value.

**Attachment 4: Quality Assurance / Quality Control Check**



ATTACHMENT 4

# **Analytical Data Quality Assurance Twenty-First Quarter (July 1998) Corrective Action Groundwater Monitoring Program Results Reichhold, Inc.**

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Groundwater samples were analyzed for organics (volatiles, semivolatiles, pesticides/PCBs), metals, cyanide, formaldehyde, and total organic carbon (TOC) in accordance with the monitoring requirements under Reichhold's corrective action monitoring program. The specific sample analytes are presented in the introduction to this document.

Analyses were carried out by QAL Redding Laboratory.

The analysis of groundwater samples for the volatiles, semivolatiles, pesticides/PCBs, metals, and cyanide were carried out by the EPA CLP protocols. These protocols are based on EPA SW846 methods and include additional QA/QC procedures. The protocols include:

- Chain-of-custody and preservation procedures
- Holding times
- Analytical methodology and detection limits
- QA/QC procedures
- QC control limits and rerun requirements
- Reporting requirements
- Documentation

Formaldehyde was analyzed by EPA Method 8315 as this parameter is not covered under CLP protocols; an equivalent level of quality assurance was maintained as for the other parameters. Similarly TOC was analyzed by EPA Method 415.2.

CH2M HILL conducted for Reichhold an extensive quality assurance program for conformance to EPA CLP protocols and in accordance with Section V.B.(4)(v) of Reichhold's RCRA permit.

The overall completeness of the data with regard to the EPA criteria and control limits was found to be above 90 percent. Completeness is defined as the percent of data found valid in accordance with EPA CLP control limits and criteria; these limits and criteria are noted below. In general practice, 90 percent completeness represents high-quality data.

CLP analytical and quality assurance protocols for TCL pollutants are described in the EPA invitation for bid documents (CLP Statement of Work 1990 or later).

**Table 4-2**  
**WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY**

Aroclor-1248	5.00											56-123
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\*Values outside of QC limits.

**Table 4-3**  
**Organics Method Blank Detects Summary\***

Fraction	Blank ID	Compound (HSL)	Conc. (µg/l)	Associated Samples
VOA	M0730W01	Acetone 2-Butanone 2-Flexanone	9J 5J 5J	SDG RF 403 SDG RF 403 SDG RF 403
VOA	M0731W01	Acetone	5J	SDG RF 403
VOA	M0731W01	Acetone	5J	SDG RF 413
VOA	M0805W01	Acetone	6J	SDG RF 421 SDG RF 430

\*For volatiles, semivolatiles and pesticide/PCB's blanks no detects were reported.

**Table 4-4**  
**Metals and Cyanide Matrix Spike Sample Recovery (Accuracy)**

Sample	Control Limit %R	Spike Sample Result (SSR) ( $\mu\text{g/l}$ )	Sample Result (SR) ( $\mu\text{g/l}$ )	Spike Added (SA)	%R
Aluminum					
Antimony	75-125	516.6100	10.2000U	500.00	103.3
Arsenic	75-125	19.6000	0.9000B	20.00	93.5
Barium	75-125	1844.1800	19.7800B	2000.00	91.2
Beryllium	75-125	47.9600	0.3000B	50.00	95.3
Cadmium	75-125	45.2400	0.9000U	50.00	90.5
Calcium					
Chromium	75-125	192.0400	1.9000U	200.00	96.0
Cobalt	75-125	469.5800	5.1000U	500.00	93.9
Copper	75-125	240.8000	2.1300B	250.00	95.5
Cyanide	75-125	94.62	3.19B	100.00	91.4
Iron					
Lead	75-125	20.6000	0.3000U	20.00	103.0
Manganese	75-125	1163.7400	707.0700	500.00	91.3
Magnesium					
Mercury	75-125	1.8800	0.1000U	2.00	94.0
Molybdenum	75-125	475.6700	1.8000U	500.00	95.1
Nickel	75-125	473.2800	4.4000U	500.00	94.7
Potassium					
Selenium					
Silver	75-125	51.8000	2.3000U	50.00	103.6
Sodium					
Thallium					
Vanadium	75-125	483.4200	11.1700B	500.00	94.4
Zinc	75-125	479.6700	4.3300B	500.00	95.1
Cyanide	75-125	98.4	<10	100	98.4

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-4**  
**Metals and Cyanide Matrix Spike Sample Recovery (Accuracy)**  
**(continued)**

Sample	Control Limit %R	Spike Sample Result (SSR) ( $\mu\text{g/l}$ )	Sample Result (SR) ( $\mu\text{g/l}$ )	Spike Added (SA) ( $\mu\text{g/l}$ )	%R
Aluminum					
Antimony	75-125	513.1500	16.0400B	500.00	99.4
Arsenic	75-125	20.3000	1.2000B	20.00	95.5
Barium	75-125	1952.1300	125.9900B	2000.00	91.3
Beryllium	75-125	47.4200	0.2800B	50.00	94.3
Cadmium	75-125	44.4500	1.1600B	50.00	86.6
Calcium					
Chromium	75-125	201.4500	11.4800	200.00	95.0
Cobalt	75-125	461.3200	5.1000U	500.00	92.3
Copper	75-125	237.9000	2.2800B	250.00	94.2
Cyanide					
Iron					
Lead	75-125	19.3000	0.6000B	20.00	93.5
Manganese	75-125	1386.8800	947.5100	500.00	87.9
Magnesium					
Mercury	75-125	11.2000	0.5000B	10.00	107.0
Molybdenum	75-125	471.8200	1.8000U	500.00	94.4
Nickel	75-125	466.8700	4.4000U	500.00	93.4
Potassium					
Selenium					
Silver	75-125	49.3300	2.3000U	50.00	98.7
Sodium					
Thallium					
Vanadium	75-125	525.8800	59.2500	500.00	93.3
Zinc	75-125	471.5300	2.6600B	500.00	93.8
Cyanide	75-125	103	<10	100	103

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-5**  
**Metals and Cyanide Duplicates (Precision)**

Sample	Control Limit	Sample (S)	Duplicate (D)	RPD
Aluminum				
Antimony		10.2000U	16.6400B	200.0
Arsenic		0.900B	0.8000U	200.0
Barium		19.7800B	19.5900B	1.0
Beryllium		0.3000B	0.1000U	200.0
Cadmium		0.9000U	1.3800B	200.0
Calcium				
Chromium		1.9000U	1.9000U	
Cobalt		5.1000U	5.1000U	
Copper		2.1300B	1.8200B	15.7
Cyanide		3.19B	4.39B	31.8
Iron				
Lead		0.3000U	0.3000U	
Manganese		707.0700	705.9500	0.2
Magnesium				
Mercury		0.1000U	0.1000U	
Molybdenum		1.8000U	1.8000U	
Nickel		4.4000U	4.4000U	
Potassium				
Selenium				
Silver		2.3000U	3.0600B	200.0
Sodium				
Thallium				
Vanadium		11.1700B	12.1400B	8.3
Zinc		4.3300B	5.2800B	19.8

U = Not detected above the reported limit.  
 B = Below detection limit.  
 NC = Non calculable.

**Table 4-5**  
**Metals and Cyanide Duplicates (Precision)**

Sample	Control Limit	Sample (S)	Duplicate (D)	RPD
Aluminum				
Antimony		16.0400B	18.8400B	16.1
Arsenic		1.2000B	1.5000B	22.2
Barium		125.9900B	125.6900B	0.2
Beryllium		0.2800B	0.2800B	0.0
Cadmium		1.1600B	1.0500B	10.0
Calcium				
Chromium	10.0	11.4800	11.3100	1.5
Cobalt		5.1000U	5.1000U	
Copper		2.2800B	2.4400B	6.8
Cyanide				
Iron				
Lead		0.6000B	0.7000B	15.4
Manganese		947.5100	945.8900	0.2
Magnesium				
Mercury	0.2	0.5000B	0.5000U	200.0
Molybdenum		1.8000U	1.8000U	
Nickel		4.4000U	4.4000U	
Potassium				
Selenium				
Silver		2.3000U	2.3000U	
Sodium				
Thallium				
Vanadium	50.0	59.2500	59.4300	0.3
Zinc		2.6600B	2.8800B	7.9
Cyanide	25	<10	<10	0
Cyanide	25	<10	<10	0

U = Not detected above the reported limit.

B = Below detection limit.

NC = Non calculable.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum	18.9U	18.9U	18.9U	18.9U	18.900U	P
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	0.8U	0.8U	0.8U	0.8U	0.800U	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.1U	0.1U	0.2B	0.1U	0.100U	P
Cadmium	0.9U	0.9U	0.9U	0.9B	0.900U	P
Calcium	21.9U	26.7B	21.9U	41.4B	140.830B	P
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1U	1.4B	1.1U	1.4B	1.220B	P
Cyanide						
Iron	9.2B	9.4B	5.3B	4.3U	12.520B	P
Lead	0.3U	0.3U	0.3U	0.3U	0.300U	F
Manganese	21.1U	21.1U	21.1U	21.1U	21.100U	P
Magnesium	0.4U	0.4U	0.4U	0.4U	0.400U	P
Mercury	0.1U	0.1U	0.1U	0.1U	0.100U	CV
Molybdenum	1.8U	1.8U	1.8U	1.8U	1.800U	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium	372.0U	372.0U	372.0U	372.0U	372.000U	P
Selenium	0.8B	0.6U	1.0B		0.600U	F
Silver	2.8B	2.3U	2.3U	3.9B	2.680B	P
Sodium	22.4U	22.4U	29.4B	22.4U	139.530B	P
Thallium	1.0U	1.0U	1.0U		1.000U	F
Vanadium	1.7U	1.7U	1.7U	1.7U	1.700U	P
Zinc	1.0B	0.9B	1.0B	0.6U	1.540B	P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum		18.9U	18.9U		P
Antimony		10.2U	10.2U		P
Arsenic		0.8U			F
Barium		0.6U	0.6U		P
Beryllium		0.2B	0.1U		P
Cadmium		1.2B	0.9U		P
Calcium		26.8B	29.2B		P
Chromium		1.9U	1.9U		P
Cobalt		5.1U	5.1U		P
Copper		1.8B	1.5B		P
Cyanide					
Iron		13.0B	8.9B		P
Lead		-0.3B			F
Manganese		21.1U	21.1U		P
Magnesium		0.4U	0.4U		P
Mercury	0.1B	0.1U	0.1U	0.1U	CV
Molybdenum		1.8U	1.8U		P
Nickel		4.4U	4.4U		P
Potassium		372.0U	372.0U		P
Selenium					NR
Silver		2.5B	2.3B		P
Sodium		22.4U	22.4U		P
Thallium					NR
Vanadium		2.1B	1.7U		P
Zinc		0.6U	0.6U		P

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values (continued)**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						NR
Antimony						NR
Arsenic	-1.1B	-1.2B	-1.1B			F
Barium						NR
Beryllium						NR
Cadmium						NR
Calcium						NR
Chromium						NR
Cobalt						NR
Copper						NR
Cyanide						
Iron						NR
Lead	0.4B	0.3U	-0.3B	-0.3B		F
Manganese						NR
Magnesium						NR
Mercury			0.1U	0.1U	0.1U	CV
Molybdenum						NR
Nickel						NR
Potassium						NR
Selenium						NR
Silver						NR
Sodium						NR
Thallium						NR
Vanadium						NR
Zinc						NR

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values (continued)**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						NR
Antimony						NR
Arsenic						NR
Barium						NR
Beryllium						NR
Cadmium						NR
Calcium						NR
Chromium						NR
Cobalt						NR
Copper						NR
Cyanide						NR
Iron						NR
Lead		0.3U				F
Manganese						NR
Magnesium						NR
Mercury						NR
Molybdenum						NR
Nickel						NR
Potassium						NR
Selenium						NR
Silver						NR
Sodium						NR
Thallium						NR
Vanadium						NR
Zinc						NR

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	0.8U	0.8U	0.8U	0.8U	0.800U	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.1U	0.1U	0.2B	0.1U	0.100U	P
Cadmium	0.9U	0.9U	0.9U	0.9B	0.900U	P
Calcium						
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1U	1.4B	1.1U	1.4B	1.200B	P
Cyanide						
Iron						
Lead	0.3U	0.3U	0.3U	0.3U	0.300U	F
Manganese	0.4U	0.4U	0.4U	0.4U	0.400U	P
Magnesium	0.4U	0.4U	0.4U	0.4U	0.400U	P
Mercury	0.1UB	0.1U	0.1U	0.1U	0.100U	CV
Molybdenum	1.8U	1.8U	1.8U	1.8U	1.800U	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium						
Selenium						
Silver	2.8B	2.3U	2.3U	3.9B	2.680B	P
Sodium						
Thallium						
Vanadium	1.7U	1.7U	1.7U	1.7U	1.700U	P
Zinc	1.0B	0.9B	1.0B	0.6U	1.540B	P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum					
Antimony		10.2U	10.2U		P
Arsenic		0.8U			F
Barium		0.6U	0.6U		P
Beryllium		0.2B	0.1U		P
Cadmium		1.2B	0.9U		P
Calcium					
Chromium		1.9U	1.9U		P
Cobalt		5.1U	5.1U		P
Copper		1.8B	1.5B		P
Cyanide					
Iron					
Lead		-0.3B	-0.3B		F
Manganese		0.4U	0.4U		P
Magnesium					
Mercury		0.1U	0.1U	0.1U	CV
Molybdenum		1.8U	1.8U		P
Nickel		4.4U	4.4U		P
Potassium					
Selenium					
Silver		2.5B	2.3B		P
Sodium					
Thallium					
Vanadium		2.1B	1.7U		P
Zinc		0.6U	0.6U		P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						NR
Antimony						NR
Arsenic	-1.1B	-1.2B	-1.1B			F
Barium						NR
Beryllium						NR
Cadmium						NR
Calcium						NR
Chromium						NR
Cobalt						NR
Copper						NR
Cyanide						NR
Iron						NR
Lead	0.4B	0.3U	-0.3B	-0.3B		F
Manganese						NR
Magnesium						NR
Mercury						NR
Molybdenum						NR
Nickel						NR
Potassium						NR
Selenium						NR
Silver						NR
Sodium						NR
Thallium						NR
Vanadium						NR
Zinc						NR

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	-1.1B	-1.2B	-1.1B	-0.8B	-0.800B	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.1U	0.1U	0.2B	0.1U	0.100U	P
Cadmium	0.9U	0.9U	0.9U	0.9B	0.900U	P
Calcium						
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1U	1.4B	1.1U	1.4B	1.370B	P
Cyanide						
Iron						
Lead	0.3U	0.3U	0.3U	0.3U	0.800B	F
Manganese	0.4U	0.4U	0.4U	0.4U	0.400U	P
Magnesium						
Mercury	0.1B	0.1B	0.1U		0.100u	CV
Molybdenum	1.8U	1.8U	1.8U	1.8U	1.800U	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium						
Selenium						
Silver	2.8B	2.3U	2.3U	3.9B	2.330B	P
Sodium						
Thallium						
Vanadium	1.7U	1.7U	1.7U	1.7U	1.700U	P
Zinc	1.0B	0.9B	1.0B	0.6U	1.530B	P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum					
Antimony		10.2U	10.2U	10.2U	P
Arsenic		-0.9B	-1.1B		F
Barium		0.6U	0.6U	0.6U	P
Beryllium		0.2B	0.1U	0.1U	P
Cadmium		1.2B	0.9U	0.9U	P
Calcium					
Chromium		1.9U	1.9U	1.9U	P
Cobalt		5.1U	5.1U	5.1U	P
Copper		1.8B	1.5B	1.1U	P
Cyanide					
Iron					
Lead		0.3U	0.3B		F
Manganese		0.4U	0.4U	0.4U	P
Magnesium					
Mercury					NR
Molybdenum		1.8U	1.8U	1.8U	P
Nickel		4.4U	4.4U	4.4U	P
Potassium					
Selenium					
Silver		2.5B	2.3B	2.3U	P
Sodium					
Thallium					
Vanadium		2.1B	1.7U	1.7U	P
Zinc		0.6U	0.6U	0.7B	P

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum					
Antimony		10.2U	10.2U		P
Arsenic					
Barium		0.6U	0.6U		P
Beryllium		0.1U	0.2B		P
Cadmium		0.9U	0.9U		P
Calcium					
Chromium		1.9U	1.9U		P
Cobalt		5.1U	5.1U		P
Copper		1.1U	1.1U		P
Cyanide					
Iron					
Lead					NR
Manganese		0.4U	0.4U		P
Magnesium					
Mercury					NR
Molybdenum		1.8U	1.8U		NR
Nickel		4.4U	4.4U		P
Potassium					
Selenium					
Silver		2.3U	2.3U		P
Sodium					
Thallium					
Vanadium		1.7U	1.7U		P
Zinc		0.6U	0.6U		P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	0.8U	0.8U	0.8U	0.8U	0.800U	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.2B	0.2B	0.1U	0.2B	0.160B	P
Cadmium	0.9U	0.9U	0.9U	1.3B	0.900U	P
Calcium						
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1B	1.1U	1.1U	2.2B	1.100U	P
Cyanide						
Iron						
Lead	0.5B	0.3U	0.3B	0.3U	0.500B	F
Manganese	0.4U	0.4U	0.4U	0.4U	0.400U	P
Magnesium						
Mercury	0.1b	0.1b	0.1u		0.100U	CV
Molybdenum	2.3B	1.9B	1.8U	1.8u	1.800u	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium						
Selenium						
Silver	3.6B	2.3U	2.3U	3.8B	2.300U	P
Sodium						
Thallium						
Vanadium	1.7U	1.7U	1.7U	2.0B	1.700U	P
Zinc	0.8B	0.6U	0.7B	1.0B	1.980B	P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum					
Antimony		10.2U	10.2U	10.2U	P
Arsenic		0.8U	0.8U		F
Barium		0.6U	0.6U	0.6U	P
Beryllium		0.1U	0.1U	0.1U	P
Cadmium		1.0B	0.9U	0.9U	P
Calcium					
Chromium		1.9U	-2.4B	1.9U	P
Cobalt		5.1U	5.1U	5.1U	P
Copper		2.0B	1.1U	1.4B	P
Cyanide					
Iron					
Lead		-0.3B			F
Manganese		0.4U	0.4U	0.4U	P
Magnesium					
Mercury					NR
Molybdenum		1.8U	3.2B	1.8U	P
Nickel		4.4U	4.4U	4.4U	P
Potassium					
Selenium					
Silver		3.3B	2.3U	2.3U	P
Sodium					
Thallium					
Vanadium		1.7B	1.7U	1.7U	P
Zinc		0.6U	0.8B	0.8B	P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum	18.9U	18.9U	18.9U	18.9U	18.900U	P
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	0.8U	0.8U	0.8U		0.800U	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.1U	0.1U	0.1U	0.1U	0.100u	P
Cadmium	0.9u	0.9U	0.9U	0.9U	0.900U	P
Calcium	21.9U	21.9U	21.9U	21.9U	37.640B	P
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1U	1.8B	1.1U	1.1U	1.100U	P
Cyanide						
Iron	25.0B	14.0B	4.3U	9.7B	16.350B	P
Lead	0.3U	0.3U	0.3U		0.300U	F
Manganese	0.4U	0.4U	0.4U	0.4U	0.400U	P
Magnesium	21.1U	22.4B	21.1U	26.5B	21.100U	P
Mercury	0.1U	0.1U	0.1U		0.100U	CV
Molybdenum	1.8U	1.8U	1.8U	1.8U	1.800U	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium	372.0U	372.0U	372.0U	372.0U	372.000U	P
Selenium	0.6U	0.6U	0.6U		0.600U	F
Silver	2.3U	2.3U	2.3U	2.3U	2.300U	P
Sodium	22.4U	22.4U	22.4U	22.4U	22.400U	P
Thallium	1.0U	1.0U	1.0U	1.0U	1.000U	F
Vanadium	1.7U	1.7U	1.7U	1.7U	1.700U	P
Zinc	0.6U	1.0B	0.6U	0.6U	1.980B	P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Cyanide Blank Values**

Blank ID	Cyanide ( $\mu\text{g/l}$ )
Method Blanks	<10U

**Table 4-7**  
**Formaldehyde Accuracy and Precision Measurement**

Matrix Spikes					
Sample	Concentration Spiked ( $\mu\text{g/l}$ )	Sample Result ( $\mu\text{g/l}$ )	Spike Result ( $\mu\text{g/l}$ )	Spike Percent Recovery	
MW-46(I)	100	23	102	79	
MW-39(I)	100	110	230	120	
Duplicates (spiked results)					
Sample	Concentration Spiked ( $\mu\text{g/l}$ )	Sample Result ( $\mu\text{g/l}$ )	Spike Result ( $\mu\text{g/l}$ )	Spike Percent Recovery	RPD
MW-46(I)D	100	23	129	106	29
MW 39(I)D	100	110	260	150	22

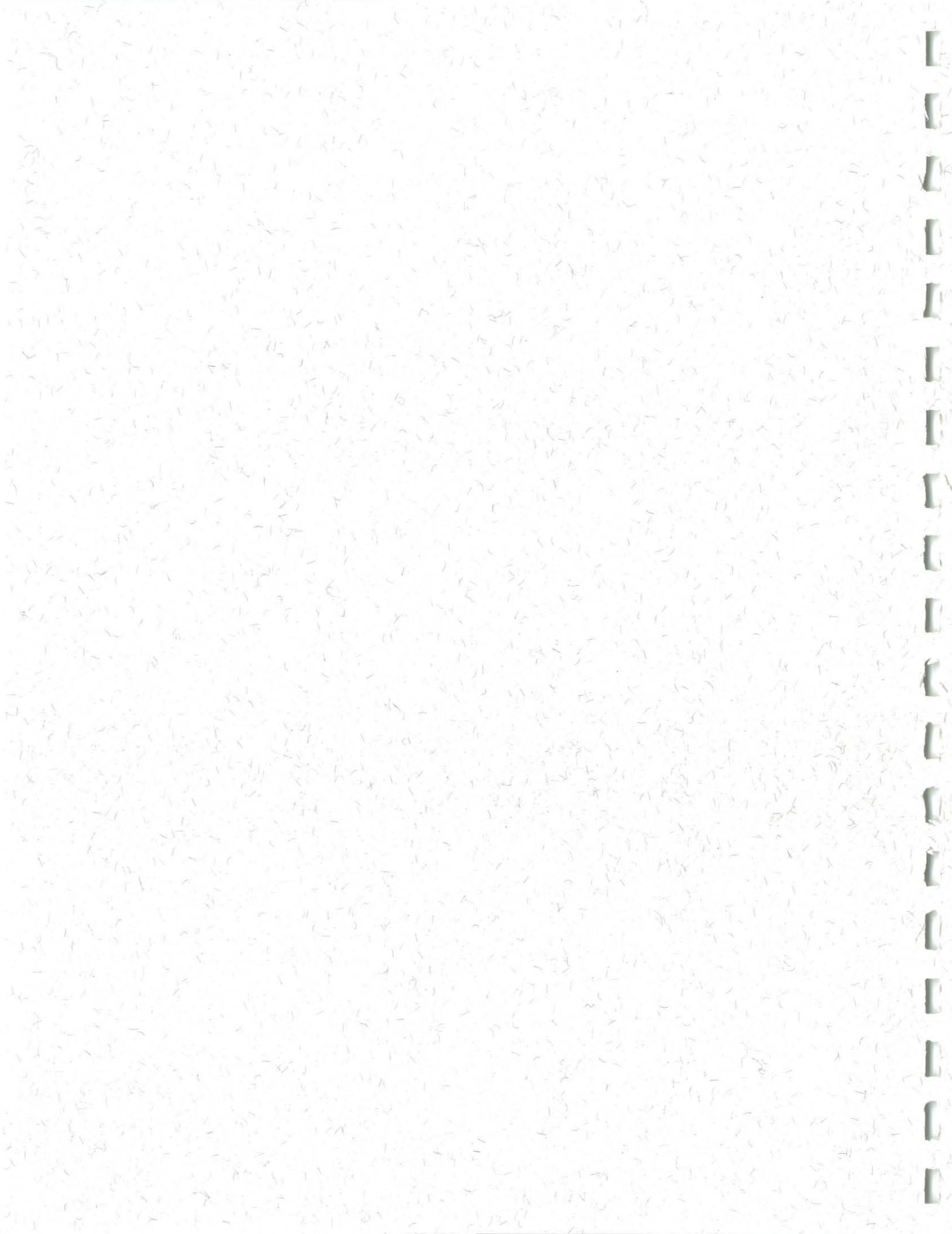
**Table 4-7**  
**Formaldehyde Blank Summary**

Blank ID	Formaldehyde ( $\mu\text{g/l}$ )
Method blanks	<20U

**Table 4-8**  
**TOC Blank Summary**

TOC	Blank Summary
Method blanks	<1 mg/l

**Attachment 4: Quality Assurance / Quality Control Check**



**ATTACHMENT 4**

# **Analytical Data Quality Assurance Twenty-First Quarter (July 1998) Corrective Action Groundwater Monitoring Program Results Reichhold, Inc.**

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Groundwater samples were analyzed for organics (volatiles, semivolatiles, pesticides/PCBs), metals, cyanide, formaldehyde, and total organic carbon (TOC) in accordance with the monitoring requirements under Reichhold's corrective action monitoring program. The specific sample analytes are presented in the introduction to this document.

Analyses were carried out by QAL Redding Laboratory.

The analysis of groundwater samples for the volatiles, semivolatiles, pesticides/PCBs, metals, and cyanide were carried out by the EPA CLP protocols. These protocols are based on EPA SW846 methods and include additional QA/QC procedures. The protocols include:

- Chain-of-custody and preservation procedures
- Holding times
- Analytical methodology and detection limits
- QA/QC procedures
- QC control limits and rerun requirements
- Reporting requirements
- Documentation

Formaldehyde was analyzed by EPA Method 8315 as this parameter is not covered under CLP protocols; an equivalent level of quality assurance was maintained as for the other parameters. Similarly TOC was analyzed by EPA Method 415.2.

CH2M HILL conducted for Reichhold an extensive quality assurance program for conformance to EPA CLP protocols and in accordance with Section V.B.(4)(v) of Reichhold's RCRA permit.

The overall completeness of the data with regard to the EPA criteria and control limits was found to be above 90 percent. Completeness is defined as the percent of data found valid in accordance with EPA CLP control limits and criteria; these limits and criteria are noted below. In general practice, 90 percent completeness represents high-quality data.

CLP analytical and quality assurance protocols for TCL pollutants are described in the EPA invitation for bid documents (CLP Statement of Work 1990 or later).

Guidelines for independent review and validation of CLP data are given in EPA Sample Management Office Technical Directive Document No. HQ-8410-01, Contract No. 68-01-6699 (or later revisions). Data reviews followed the above-noted guidelines. The quality assurance activities covered the following aspects of the analytical system:

- Sample chain-of-custody
- Sample preservation
- Sample holding times
- Sample preparation
- Instrument tuning, calibration, linearity, detection limits
- Standards
- Analytical methodology
- Laboratory contamination (blank)
- Accuracy measurements
- Precision measurements
- Data reduction (including identification, quality of chromatograms, and mass spectra)
- Documentation

Sample chain-of-custody, sample preservation, and sample holding times were documented as described in the CLP protocols. Sample holding times were reviewed to ensure that they were within EPA limits. Sample preparation, analytical methodology, usage of standards as established by laboratory records, and instrument output were carried out in accordance with CLP methods or an equivalent level of QA/QC for parameters not covered under the CLP (e.g., formaldehyde and molybdenum).

The analytical results were reviewed during and after analysis with regard to acceptability standards defined in the CLP protocols. The protocols define the level of effort for QC (the frequency with which the quality control procedures are to be carried out). Blank, accuracy, and precision measurements (defined below) were carried out at a 10 percent frequency in general as specified in the protocols. This same level of effort was maintained for the parameters not covered under the CLP protocols (e.g., molybdenum and formaldehyde). Instrument calibrations were also carried out at the level of frequency defined in the protocols, with an equivalent level of effort for other parameters.

The quality control data were also evaluated quantitatively. For the CLP parameters, EPA has established control limits for the evaluation of the data. These EPA limits are based on past data bases. Quality control data that are not within these limits were noted, and the impact on the results was evaluated. For non-CLP parameters, precision and accuracy were used for quantitative qualification of data.

The quality control measurements that aided in the quantitative assessment of the data are summarized in the tables presented in this supplement. These include accuracy, precision, and blank measurements; the meaning and usage of these are explained below. Other quality control parameters have been documented in accordance with EPA CLP protocols and are retained in RCI files, and the laboratory. Quality assurance review notes are also filed with these data. This documentation provides data of known quality from the most extensive state-of-the-art quality control procedures design in this area of study.

## Accuracy Measurements

Accuracy is the measure of the deviation between the true value and the observed test value. The accuracy of chemical test results is measured by establishing the average recovery. The recovery is determined by splitting a series of samples into two portions, spiking (adding a known quantity of the constituent of interest) one of the portions, and submitting both portions for laboratory and analysis as independent samples. In general, two types of recoveries are measured: matrix spike recoveries and surrogate spike recoveries. For a matrix spike, known amounts of standard compounds identical to the compounds present in the sample of interest are added to the sample. For a surrogate spike, the standards are chemically similar but not identical to the compounds in the fraction being analyzed. The purpose of the surrogate spike is to provide quality control on every sample by constantly monitoring for unusual matrix effects and gross sample processing errors. Surrogate spikes are generally done for organics analyses.

Recovery values for the samples are presented in Tables A-1 and A-2 for organics, Table A-4 for metals and cyanide, Table A-7 for formaldehyde, Table A-8 for TOC.

Perfect accuracy would be defined by 100 percent recovery. EPA control limits for CLP data are noted in tables for each parameter. Data that are outside these control limits have been flagged as noted in the footnotes. For non-CLP parameters the accuracy measurement serves as a quantitative qualifier.

## Precision Measurements

Precision is a measure of the spread of data when more than one measurement is taken on the same sample. For duplicate measurements, precision can be expressed as the relative percent difference (RPD). Acceptable precision limits are based on past data bases. Precision measurements for Reichhold samples are presented in Table A-2 for organics, Table A-5 for metals and cyanide, Table A-7 for formaldehyde and Table A-8 for TOC. The EPA CLP parameters data were again found to be within the listed control limits for above 90 percent of measurements.

## Blank Measurements

A laboratory method blank is defined as an appropriate volume of "organic-free" water that has been processed exactly as a sample (same glassware, reagents, and solvents). A blank measurement helps distinguish observed test results that are caused by contamination or instrument error from those that are intrinsic to the sample. The laboratory contaminants found in blank measurements for Reichhold samples are summarized in Table A-3 for organics, Table A-6 for metals and cyanide, Table A-7 for formaldehyde and Table A-8 for TOC. All blanks meet CLP criteria in that laboratory contaminants were found to be below EPA-specified concentration levels. The data set has been qualified with regard to organics observed in blanks noting the letter "B" next to the reported concentrations if that same constituent were observed in the blanks.

**Table 4-1**  
**WATER SURROGATE PERCENT RECOVERY SUMMARY**

	Volatile Organics			Semivolatile Organics							
	Toluene-d8 (88-110)	Bromofluoro- benzene (86-115)	1,2-Dichlo- roethane-d4 (76-114)	Nitro- benzene-d5 (35-114)	2-Fluoro- biphenyl (43-116)	Terphenyl- d14 (33-141)	Phenol-d5 (10-110)	2-Fluoro- phenol (21-110)	2,4,6-Tribromo- phenol (10-123)	2-Chloro- phenol-d4 (33-110)	1,2-Dichloro- benzene-d4 (16-110)
M0730W01LCS	96	91	100								
M0730W01	101	115	107								
MW-180	102	114	108								
MW-160	102	110	107	95	92	90	102	96	106	100	90
MW-1 (S)	102	109	125*	97	96	92	104	98	109	101	91
MW-56 (S)	97	110	110	82	77	64	96	84	96	90	77
MW-1 (S) R	100	103	120*								
WTS-INF	97	107	107	93	91	76	106	96	118	100	88
MW-2 (I)	98	108	111	97	96	88	105	101	117	105	94
MW-53 (I)	93	104	106	99	97	94	106	101	120	106	95
MW-161	96	101	105	95	93	94	106	100	121	103	93
MW-48 (I)	99	101	122*	104	95	102	112*	105	122	109	98
MW-7 (I)	96	100	106	98	95	63	108	99	116	106	94
M0731W01LCS	105	99	96								
M0731W01	106	115	101								
MW-161DL	88	100	92	0D	0D	0D	0D	0D	0D	0D	0D
MW-48 (I) DL	103	116*	95	0D	0D	0D	0D	0D	0D	0D	0D
M0731W01LCS	105	99	96								
M0731W01	106	115	101								
MW-181	103	113	104								
MW-16 (I)	106	116*	110	95	85	49	109	96	104	104	86
MW-4 (I) 2	101	120*	101	87	79	40	98	87	104	94	73
MW-4 (S)	106	116*	112								

**Table 4-1**  
**WATER SURROGATE PERCENT RECOVERY SUMMARY**

	Volatile Organics			Semivolatile Organics							
	Toluene-d8 (88-110)	Bromofluoro- benzene (86-115)	1,2-Dichloro- ethane-d4 (76-114)	Nitro- benzene-d5 (35-114)	2-Fluoro- biphenyl (43-116)	Terphenyl- d14 (33-141)	Phenol-d5 (10-110)	2-Fluoro- phenol (21-110)	2,4,6-Tribromo- phenol (10-123)	2-Chloro- phenol-d4 (33-110)	1,2-Dichloro- benzene-d4 (16-110)
MW-37 (I)	101	120*	110	94	89	34	102	96	109	102	81
M0803W01LCS	103	100	100								
M0803W01	105	115	102								
MW-4 (S) R	107	122*	108								
MW-46 (I)	110	125*	113	97	91	56	109	96	108	103	81
MW-46 (I) MS	112*	106	120*	89	85	44	96	90	99	95	81
MW-46 (I) MSD	111*	108	117*	92	84	44	100	93	102	98	79
MW-16 (I) R	115*	145*	115*								
MW-37 (I) R	117*	136*	118*								
M0804W01LCS	98	93	86								
M0804W01	91	101	77								
MW-4 (I) 2R	84*	104	98								
MW-17 (I)	103	100	91	91	88	36	104	91	112	98	85
MW-21 (S) 2	102	99	94	91	93	70	96	91	106	96	81
MW-162	100	97	93	95	84	32*	102	97	106	103	88
MW-30 (I)	101	100	92	86	78	30*	101	88	102	95	80
MW-22 (I)	102	114	99	81	78	21*	95	83	98	90	74
M0804W01LCS	98	93	86								
M0804W01	91	101	77								
MW-50 (I)	101	95	96	75	66	34	82	75	79	80	68
MW-183	104	97	98								
MW-45 (I)	101	94	92	78	63	47	88	79	82	85	73
M0805W01LCS	101	95	92								

**Table 4-1**  
**WATER SURROGATE PERCENT RECOVERY SUMMARY**

	Volatile Organics			Semivolatile Organics							
	Toluene-d8 (88-110)	Bromofluoro- benzene (86-115)	1,2-Dichlo- roethane-d4 (76-114)	Nitro- benzene-d5 (35-114)	2-Fluoro- biphenyl (43-116)	Terphenyl- d14 (33-141)	Phenol-d5 (10-110)	2-Fluoro- phenol (21-110)	2,4,6-Tribromo- phenol (10-123)	2-Chloro- phenol-d4 (33-110)	1,2-Dichloro- benzene-d4 (16-110)
M0805W01	102	95	110								
MW-36 (I)	105	100	106	80	66	48	88	82	85	88	74
M0804W01LCS	98	93	86								
M0804W01	91	101	77								
MW-44 (I)	102	94	98	78	70	36	87	80	85	84	71
MW-14 (S)	101	113	89	79	40*	42	70	84	82	87	72
MW-12 (I)	104	98	103	74	73	50	86	78	82	82	67
M0805W01LCS	101	95	92								
M0805W01	102	95	110								
MW-182	104	97	102								
MW-28 (I)	101	108	100	82	81	41	94	81	100	88	73
MW-41 (I)	106	94	104	80	83	31*	93	80	102	89	76
MW-12 (S)	100	95	104								
MW-39 (I)	101	91	100	82	82	46	92	82	90	89	74
MW-39 (I) MS	121*	93	105	82	75	48	90	87	91	91	78
MW-39 (I) MSD	99	100	82	78	71	46	89	83	82	86	73
MW-42 (S) 2	101	94	105								
Z0731WA1				88	88	86	82	78	96	86	85
Z0731WA1LCS				94	93	89	100	93	112	99	89
Z0804WA1LCS				97	92	83	103	98	107	103	88
Z0804WA1				84	90	71	94	82	93	89	73
MW-4 (I) 2DL				100	93	34	120*	102	118	109	83
MW-162 DL				0D	0D	0D	0D	0D	0D	0D	0D

**Table 4-1**  
**WATER SURROGATE PERCENT RECOVERY SUMMARY**

**Table 4-1**  
**WATER SURROGATE PERCENT RECOVERY SUMMARY**

	Volatile Organics				Semivolatile Organics					
	Toluene-d8 (88-110)	Bromofluoro- benzene (86-115)	1,2-Dichlo- roethane-d4 (76-114)	Nitro- benzene-d5 (35-114)	2-Fluoro- biphenyl (43-116)	Terphenyl- d14 (33-141)	Phenol-d5 (10-110)	2-Fluoro- phenol (21-110)	2,4,6-Tribromo- phenol (10-123)	2-Chloro- phenol-d4 (33-110)
*=Values outside of contract required QC limits.										
D=Surrogate diluted out.										

**Table 4-1a**  
**WATER SURROGATE PERCENT RECOVERY SUMMARY**

	PCBs			
	Tetrachlorom-xylene 1 (60-150)	Tetrachlorom-xylene 2 (60-150)	Decachlorobiphenyl 1 (60-150)	Decachlorobiphenyl 2 (60-150)
PBLKW1_08-01	92	99	87	81
PBLKW2_08-02	91	95	89	81
PBLKW2_08-05	102	99	89	86
PBLKW1_08-05	86	96	82	78
MW-1 (S)	92	94	80	72
MW-12 (I)	100	100	39*	38*
MW-14 (S)	81	94	86	85
MW-16 (I)	84	92	34*	29*
MW-160	91	80	82	73
MW-161	81	90	44*	39*
MW-162	0*	89	49*	44*
MW-17 (I)	88	90	59*	53*
MW-2 (I)	87	89	41*	35*
MW-21(S)				
MW-22 (I)	68	91	34*	29*
MW-28 (I)	97	101	50*	45*
MW-30 (I)	0*	88	50*	48*
MW-36 (I)	0D	0D	0D	0D
MW-37 (I)	80	89	25*	22*
MW-39 (I)	90	102	29*	26*
MW-4 (I) 2	78	83	23*	19*
MW-4(S)				
MW-41 (I)	85	102	55*	51*
MW-44 (I)	90	94	34*	30*
MW-45 (I)	83	104	45*	45*
MW-46 (I)	81	89	62	55*
MW-48 (I)	92	0*	51*	44*
MW-50 (I)	54*	89	17*	16*
MW-53 (I)	102	100	45*	40*
MW-56 (S)	89	0*	66	61
MW-7 (I)	96	96	29*	25*
WTS-INF	0*	86	34*	30*
WTS-INFRE				
MW-17(I)MS				
MW-17(I)MSD				
MW-50(I)MS				
MW-50(I)MSD				

**Table 4-1a**  
**WATER SURROGATE PERCENT RECOVERY SUMMARY**

	PCBs			
	Tetrachlorom-xylene 1 (60-150)	Tetrachlorom-xylene 2 (60-150)	Decachlorobiphenyl 1 (60-150)	Decachlorobiphenyl 2 (60-150)
PWL1_08-01	91	93	90	82
PWL2_08-02	85	90	80	73
PWL2_08-05	87	106	90	91
MW-46 (I) MS	80	87	65	57*
MW-46 (I) MSD	85	92	59*	53*
MW-39 (I) MS	87	80	37*	36*
MW-39 (I) MSD	85	89	58*	55*
PWL1_08-05	108	105	85	87
PWL2_08-05	87	106	90	91
PBLKW1_10-19	77	74	84	66
WTS-INF	71	75	40*	33*
PWL1-10-19	85	74	83	64

\*=Values outside of contract required QC limits.

Fraction	Compound	Conc. Spike ( $\mu\text{g/l}$ )		Sample Result	Conc. MS ( $\mu\text{g/l}$ )	Percent Rec	Conc. MSD ( $\mu\text{g/l}$ )	Percent Rec	RPD	EPA QC Limits	
		Spike	Duplicate							RPD	Recovery
Sample: MW-46 (I)											
VOA	1,1 dichloroethene	50	50	0.0	74	148	69	138	7	14	61-145
	Trichloroethene	50	50	0.0	47	94	48	96	2	14	71-120
	Benzene	50	50	0.0	59	118	59	118	0	11	76-127
	Toluene	50	50	0.0	55	110	57	114	4	13	76-125
SVOA	2-Chlorophenol	75	75	0.00	56	75	57	76	1	40	27-123
	4-Chloro-3-methylphenol	75	75	0.00	59	79	59	79	0	42	23-97
	Pentachlorophenol	75	75	0.00	86	115*	83	111*	4	50	9-103
	Phenol	75	75	0.00	54	72	58	77	7	42	12-110
	Acenaphthene	50	50	0.00	38	76	37	74	3	31	46-118
PCB's	Arochlor-1248	5	5	0	3.41	68	3.30	66	3.3	15	56-123
Sample: MW-39 (I)											
VOA	1,1 dichloroethene	50	50	0.0	59	118	56	112	5	14	61-145
	Trichloroethene	50	50	0.0	53	106	53	106	0	14	71-120
	Benzene	50	50	0.0	52	104	50	100	4	11	76-127
	Toluene	50	50	0.0	62	124	51	102	19*	13	76-125
SVOA	2-Chlorophenol	75	75	0.00	53	71	52	69	3	40	27-123
	4-Chloro-3-methylphenol	75	75	0.00	56	75	53	71	5	42	23-97
	Pentachlorophenol	75	75	0.00	77	103	67	89	14	50	9-103
	Phenol	75	75	0.00	52	69	50	67	3	42	12-110
	Acenaphthene	50	50	0.00	34	68	33	66	3	31	46-118
PCB's	Arochlor-1248	5	5	0	2.89	58	3.19	64	9.9	15	56-123
Sample: PWL1_10-19											

**Table 4-2**  
**WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY**

Aroclor-1248	5.00											56-123
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\*Values outside of QC limits.

**Table 4-3**  
**Organics Method Blank Detects Summary\***

Fraction	Blank ID	Compound (HSL)	Conc. (µg/l)	Associated Samples
VOA	M0730W01	Acetone 2-Butanone 2-Flexanone	9J 5J 5J	SDG RF 403 SDG RF 403 SDG RF 403
VOA	M0731W01	Acetone	5J	SDG RF 403
VOA	M0731W01	Acetone	5J	SDG RF 413
VOA	M0805W01	Acetone	6J	SDG RF 421 SDG RF 430

\*For volatiles, semivolatiles and pesticide/PCB's blanks no detects were reported.

**Table 4-4**  
**Metals and Cyanide Matrix Spike Sample Recovery (Accuracy)**

Sample	Control Limit %R	Spike Sample Result (SSR) ( $\mu\text{g/l}$ )	Sample Result (SR) ( $\mu\text{g/l}$ )	Spike Added (SA)	%R
Aluminum					
Antimony	75-125	516.6100	10.2000U	500.00	103.3
Arsenic	75-125	19.6000	0.9000B	20.00	93.5
Barium	75-125	1844.1800	19.7800B	2000.00	91.2
Beryllium	75-125	47.9600	0.3000B	50.00	95.3
Cadmium	75-125	45.2400	0.9000U	50.00	90.5
Calcium					
Chromium	75-125	192.0400	1.9000U	200.00	96.0
Cobalt	75-125	469.5800	5.1000U	500.00	93.9
Copper	75-125	240.8000	2.1300B	250.00	95.5
Cyanide	75-125	94.62	3.19B	100.00	91.4
Iron					
Lead	75-125	20.6000	0.3000U	20.00	103.0
Manganese	75-125	1163.7400	707.0700	500.00	91.3
Magnesium					
Mercury	75-125	1.8800	0.1000U	2.00	94.0
Molybdenum	75-125	475.6700	1.8000U	500.00	95.1
Nickel	75-125	473.2800	4.4000U	500.00	94.7
Potassium					
Selenium					
Silver	75-125	51.8000	2.3000U	50.00	103.6
Sodium					
Thallium					
Vanadium	75-125	483.4200	11.1700B	500.00	94.4
Zinc	75-125	479.6700	4.3300B	500.00	95.1
Cyanide	75-125	98.4	<10	100	98.4

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-4**  
**Metals and Cyanide Matrix Spike Sample Recovery (Accuracy)**  
**(continued)**

Sample	Control Limit %R	Spike Sample Result (SSR) ( $\mu\text{g/l}$ )	Sample Result (SR) ( $\mu\text{g/l}$ )	Spike Added (SA) ( $\mu\text{g/l}$ )	%R
Aluminum					
Antimony	75-125	513.1500	16.0400B	500.00	99.4
Arsenic	75-125	20.3000	1.2000B	20.00	95.5
Barium	75-125	1952.1300	125.9900B	2000.00	91.3
Beryllium	75-125	47.4200	0.2800B	50.00	94.3
Cadmium	75-125	44.4500	1.1600B	50.00	86.6
Calcium					
Chromium	75-125	201.4500	11.4800	200.00	95.0
Cobalt	75-125	461.3200	5.1000U	500.00	92.3
Copper	75-125	237.9000	2.2800B	250.00	94.2
Cyanide					
Iron					
Lead	75-125	19.3000	0.6000B	20.00	93.5
Manganese	75-125	1386.8800	947.5100	500.00	87.9
Magnesium					
Mercury	75-125	11.2000	0.5000B	10.00	107.0
Molybdenum	75-125	471.8200	1.8000U	500.00	94.4
Nickel	75-125	466.8700	4.4000U	500.00	93.4
Potassium					
Selenium					
Silver	75-125	49.3300	2.3000U	50.00	98.7
Sodium					
Thallium					
Vanadium	75-125	525.8800	59.2500	500.00	93.3
Zinc	75-125	471.5300	2.6600B	500.00	93.8
Cyanide	75-125	103	<10	100	103

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-5**  
**Metals and Cyanide Duplicates (Precision)**

Sample	Control Limit	Sample (S)	Duplicate (D)	RPD
Aluminum				
Antimony		10.2000U	16.6400B	200.0
Arsenic		0.900B	0.8000U	200.0
Barium		19.7800B	19.5900B	1.0
Beryllium		0.3000B	0.1000U	200.0
Cadmium		0.9000U	1.3800B	200.0
Calcium				
Chromium		1.9000U	1.9000U	
Cobalt		5.1000U	5.1000U	
Copper		2.1300B	1.8200B	15.7
Cyanide		3.19B	4.39B	31.8
Iron				
Lead		0.3000U	0.3000U	
Manganese		707.0700	705.9500	0.2
Magnesium				
Mercury		0.1000U	0.1000U	
Molybdenum		1.8000U	1.8000U	
Nickel		4.4000U	4.4000U	
Potassium				
Selenium				
Silver		2.3000U	3.0600B	200.0
Sodium				
Thallium				
Vanadium		11.1700B	12.1400B	8.3
Zinc		4.3300B	5.2800B	19.8

U = Not detected above the reported limit.

B = Below detection limit.

NC = Non calculable.

**Table 4-5**  
**Metals and Cyanide Duplicates (Precision)**

Sample	Control Limit	Sample (S)	Duplicate (D)	RPD
Aluminum				
Antimony		16.0400B	18.8400B	16.1
Arsenic		1.2000B	1.5000B	22.2
Barium		125.9900B	125.6900B	0.2
Beryllium		0.2800B	0.2800B	0.0
Cadmium		1.1600B	1.0500B	10.0
Calcium				
Chromium	10.0	11.4800	11.3100	1.5
Cobalt		5.1000U	5.1000U	
Copper		2.2800B	2.4400B	6.8
Cyanide				
Iron				
Lead		0.6000B	0.7000B	15.4
Manganese		947.5100	945.8900	0.2
Magnesium				
Mercury	0.2	0.5000B	0.5000U	200.0
Molybdenum		1.8000U	1.8000U	
Nickel		4.4000U	4.4000U	
Potassium				
Selenium				
Silver		2.3000U	2.3000U	
Sodium				
Thallium				
Vanadium	50.0	59.2500	59.4300	0.3
Zinc		2.6600B	2.8800B	7.9
Cyanide	25	<10	<10	0
Cyanide	25	<10	<10	0

U = Not detected above the reported limit.

B = Below detection limit.

NC = Non calculable.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum	18.9U	18.9U	18.9U	18.9U	18.900U	P
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	0.8U	0.8U	0.8U	0.8U	0.800U	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.1U	0.1U	0.2B	0.1U	0.100U	P
Cadmium	0.9U	0.9U	0.9U	0.9B	0.900U	P
Calcium	21.9U	26.7B	21.9U	41.4B	140.830B	P
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1U	1.4B	1.1U	1.4B	1.220B	P
Cyanide						
Iron	9.2B	9.4B	5.3B	4.3U	12.520B	P
Lead	0.3U	0.3U	0.3U	0.3U	0.300U	F
Manganese	21.1U	21.1U	21.1U	21.1U	21.100U	P
Magnesium	0.4U	0.4U	0.4U	0.4U	0.400U	P
Mercury	0.1U	0.1U	0.1U	0.1U	0.100U	CV
Molybdenum	1.8U	1.8U	1.8U	1.8U	1.800U	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium	372.0U	372.0U	372.0U	372.0U	372.000U	P
Selenium	0.8B	0.6U	1.0B		0.600U	F
Silver	2.8B	2.3U	2.3U	3.9B	2.680B	P
Sodium	22.4U	22.4U	29.4B	22.4U	139.530B	P
Thallium	1.0U	1.0U	1.0U		1.000U	F
Vanadium	1.7U	1.7U	1.7U	1.7U	1.700U	P
Zinc	1.0B	0.9B	1.0B	0.6U	1.540B	P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum		18.9U	18.9U		P
Antimony		10.2U	10.2U		P
Arsenic		0.8U			F
Barium		0.6U	0.6U		P
Beryllium		0.2B	0.1U		P
Cadmium		1.2B	0.9U		P
Calcium		26.8B	29.2B		P
Chromium		1.9U	1.9U		P
Cobalt		5.1U	5.1U		P
Copper		1.8B	1.5B		P
Cyanide					
Iron		13.0B	8.9B		P
Lead		-0.3B			F
Manganese		21.1U	21.1U		P
Magnesium		0.4U	0.4U		P
Mercury	0.1B	0.1U	0.1U	0.1U	CV
Molybdenum		1.8U	1.8U		P
Nickel		4.4U	4.4U		P
Potassium		372.0U	372.0U		P
Selenium					NR
Silver		2.5B	2.3B		P
Sodium		22.4U	22.4U		P
Thallium					NR
Vanadium		2.1B	1.7U		P
Zinc		0.6U	0.6U		P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values (continued)**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						NR
Antimony						NR
Arsenic	-1.1B	-1.2B	-1.1B			F
Barium						NR
Beryllium						NR
Cadmium						NR
Calcium						NR
Chromium						NR
Cobalt						NR
Copper						NR
Cyanide						
Iron						NR
Lead	0.4B	0.3U	-0.3B	-0.3B		F
Manganese						NR
Magnesium						NR
Mercury			0.1U	0.1U	0.1U	CV
Molybdenum						NR
Nickel						NR
Potassium						NR
Selenium						NR
Silver						NR
Sodium						NR
Thallium						NR
Vanadium						NR
Zinc						NR

U = Not detected above the reported limit.  
 B = Below detection limit.

**Table 4-6**  
**Metals Blank Values (continued)**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						NR
Antimony						NR
Arsenic						NR
Barium						NR
Beryllium						NR
Cadmium						NR
Calcium						NR
Chromium						NR
Cobalt						NR
Copper						NR
Cyanide						NR
Iron						NR
Lead		0.3U				F
Manganese						NR
Magnesium						NR
Mercury						NR
Molybdenum						NR
Nickel						NR
Potassium						NR
Selenium						NR
Silver						NR
Sodium						NR
Thallium						NR
Vanadium						NR
Zinc						NR

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	0.8U	0.8U	0.8U	0.8U	0.800U	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.1U	0.1U	0.2B	0.1U	0.100U	P
Cadmium	0.9U	0.9U	0.9U	0.9B	0.900U	P
Calcium						
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1U	1.4B	1.1U	1.4B	1.200B	P
Cyanide						
Iron						
Lead	0.3U	0.3U	0.3U	0.3U	0.300U	F
Manganese	0.4U	0.4U	0.4U	0.4U	0.400U	P
Magnesium	0.4U	0.4U	0.4U	0.4U	0.400U	P
Mercury	0.1UB	0.1U	0.1U	0.1U	0.100U	CV
Molybdenum	1.8U	1.8U	1.8U	1.8U	1.800U	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium						
Selenium						
Silver	2.8B	2.3U	2.3U	3.9B	2.680B	P
Sodium						
Thallium						
Vanadium	1.7U	1.7U	1.7U	1.7U	1.700U	P
Zinc	1.0B	0.9B	1.0B	0.6U	1.540B	P

U = Not detected above the reported limit.

B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum					
Antimony		10.2U	10.2U		P
Arsenic		0.8U			F
Barium		0.6U	0.6U		P
Beryllium		0.2B	0.1U		P
Cadmium		1.2B	0.9U		P
Calcium					
Chromium		1.9U	1.9U		P
Cobalt		5.1U	5.1U		P
Copper		1.8B	1.5B		P
Cyanide					
Iron					
Lead		-0.3B	-0.3B		F
Manganese		0.4U	0.4U		P
Magnesium					
Mercury		0.1U	0.1U	0.1U	CV
Molybdenum		1.8U	1.8U		P
Nickel		4.4U	4.4U		P
Potassium					
Selenium					
Silver		2.5B	2.3B		P
Sodium					
Thallium					
Vanadium		2.1B	1.7U		P
Zinc		0.6U	0.6U		P

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						NR
Antimony						NR
Arsenic	-1.1B	-1.2B	-1.1B			F
Barium						NR
Beryllium						NR
Cadmium						NR
Calcium						NR
Chromium						NR
Cobalt						NR
Copper						NR
Cyanide						NR
Iron						NR
Lead	0.4B	0.3U	-0.3B	-0.3B		F
Manganese						NR
Magnesium						NR
Mercury						NR
Molybdenum						NR
Nickel						NR
Potassium						NR
Selenium						NR
Silver						NR
Sodium						NR
Thallium						NR
Vanadium						NR
Zinc						NR

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	-1.1B	-1.2B	-1.1B	-0.8B	-0.800B	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.1U	0.1U	0.2B	0.1U	0.100U	P
Cadmium	0.9U	0.9U	0.9U	0.9B	0.900U	P
Calcium						
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1U	1.4B	1.1U	1.4B	1.370B	P
Cyanide						
Iron						
Lead	0.3U	0.3U	0.3U	0.3U	0.800B	F
Manganese	0.4U	0.4U	0.4U	0.4U	0.400U	P
Magnesium						
Mercury	0.1B	0.1B	0.1U		0.100u	CV
Molybdenum	1.8U	1.8U	1.8U	1.8U	1.800U	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium						
Selenium						
Silver	2.8B	2.3U	2.3U	3.9B	2.330B	P
Sodium						
Thallium						
Vanadium	1.7U	1.7U	1.7U	1.7U	1.700U	P
Zinc	1.0B	0.9B	1.0B	0.6U	1.530B	P

U = Not detected above the reported limit.

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**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum					
Antimony		10.2U	10.2U	10.2U	P
Arsenic		-0.9B	-1.1B		F
Barium		0.6U	0.6U	0.6U	P
Beryllium		0.2B	0.1U	0.1U	P
Cadmium		1.2B	0.9U	0.9U	P
Calcium					
Chromium		1.9U	1.9U	1.9U	P
Cobalt		5.1U	5.1U	5.1U	P
Copper		1.8B	1.5B	1.1U	P
Cyanide					
Iron					
Lead		0.3U	0.3B		F
Manganese		0.4U	0.4U	0.4U	P
Magnesium					
Mercury					NR
Molybdenum		1.8U	1.8U	1.8U	P
Nickel		4.4U	4.4U	4.4U	P
Potassium					
Selenium					
Silver		2.5B	2.3B	2.3U	P
Sodium					
Thallium					
Vanadium		2.1B	1.7U	1.7U	P
Zinc		0.6U	0.6U	0.7B	P

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )		Preparation Blank	M
Aluminum					
Antimony		10.2U	10.2U		P
Arsenic					
Barium		0.6U	0.6U		P
Beryllium		0.1U	0.2B		P
Cadmium		0.9U	0.9U		P
Calcium					
Chromium		1.9U	1.9U		P
Cobalt		5.1U	5.1U		P
Copper		1.1U	1.1U		P
Cyanide					
Iron					
Lead					NR
Manganese		0.4U	0.4U		P
Magnesium					
Mercury					NR
Molybdenum		1.8U	1.8U		NR
Nickel		4.4U	4.4U		P
Potassium					
Selenium					
Silver		2.3U	2.3U		P
Sodium					
Thallium					
Vanadium		1.7U	1.7U		P
Zinc		0.6U	0.6U		P

U = Not detected above the reported limit.  
B = Below detection limit.

**Table 4-6**  
**Metals Blank Values**

Analyte	Initial Calib. Blank ( $\mu\text{g/l}$ )	Continuing Calibrating Blank ( $\mu\text{g/l}$ )			Preparation Blank	M
Aluminum						
Antimony	10.2U	10.2U	10.2U	10.2U	10.200U	P
Arsenic	0.8U	0.8U	0.8U	0.8U	0.800U	F
Barium	0.6U	0.6U	0.6U	0.6U	0.600U	P
Beryllium	0.2B	0.2B	0.1U	0.2B	0.160B	P
Cadmium	0.9U	0.9U	0.9U	1.3B	0.900U	P
Calcium						
Chromium	1.9U	1.9U	1.9U	1.9U	1.900U	P
Cobalt	5.1U	5.1U	5.1U	5.1U	5.100U	P
Copper	1.1B	1.1U	1.1U	2.2B	1.100U	P
Cyanide						
Iron						
Lead	0.5B	0.3U	0.3B	0.3U	0.500B	F
Manganese	0.4U	0.4U	0.4U	0.4U	0.400U	P
Magnesium						
Mercury	0.1b	0.1b	0.1u		0.100U	CV
Molybdenum	2.3B	1.9B	1.8U	1.8u	1.800u	P
Nickel	4.4U	4.4U	4.4U	4.4U	4.400U	P
Potassium						
Selenium						
Silver	3.6B	2.3U	2.3U	3.8B	2.300U	P
Sodium						
Thallium						
Vanadium	1.7U	1.7U	1.7U	2.0B	1.700U	P
Zinc	0.8B	0.6U	0.7B	1.0B	1.980B	P

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B = Below detection limit.

**Table 4-6**  
**Cyanide Blank Values**

Blank ID	Cyanide ( $\mu\text{g/l}$ )
Method Blanks	<10U

**Table 4-7**  
**Formaldehyde Accuracy and Precision Measurement**

Matrix Spikes					
Sample	Concentration Spiked ( $\mu\text{g/l}$ )	Sample Result ( $\mu\text{g/l}$ )	Spike Result ( $\mu\text{g/l}$ )	Spike Percent Recovery	
MW-46(I)	100	23	102	79	
MW-39(I)	100	110	230	120	
Duplicates (spiked results)					
Sample	Concentration Spiked ( $\mu\text{g/l}$ )	Sample Result ( $\mu\text{g/l}$ )	Spike Result ( $\mu\text{g/l}$ )	Spike Percent Recovery	RPD
MW-46(I)D	100	23	129	106	29
MW 39(I)D	100	110	260	150	22

**Table 4-7**  
**Formaldehyde Blank Summary**

Blank ID	Formaldehyde ( $\mu\text{g/l}$ )
Method blanks	<20U

**Table 4-8**  
**TOC Blank Summary**

TOC	Blank Summary
Method blanks	<1 mg/l